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Mariners Weather Log

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Front Cover: The hull of the sinking coal ship MARINE ELECTRIC is barely above water prior to sinking off the Virginia coast (see page 156). Only 3 of the 36 crewmen survived the ice cold water. Wide World Photo.

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Mariners Weather Log

Editor: Elwyn E. Wilson

July-August-September 1983
Volume 27, Number 3
Washington, D.C.

Routing
Master _____

Observing Officers
_____
_____
_____

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The Secretary of Commerce has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 1, 1985.

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Mariners Weather Log

GULF STREAM VARIABILITY AND WIDTH

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Satellite Field Services Station, NOAA
Miami, Florida

An earlier study by the authors, together with John Wilder, appeared in the September-October 1981 issue of the Mariners Weather Log under the title "A Provisional Gulf Stream System Climatology". That article provided a first view of the normal position of the Gulf Stream System and the limits of its location as determined from infrared satellite imagery.

Since that time, dissemination of our operational Gulf Stream System analyses to mariners has been expanded to include broadcasts by NOAA Weather Radios from Key West to Cape Hatteras giving the Gulf Stream location, width, and maximum temperature in reference to 31 navigation lights or buoys along the coast. Of those lights or buoys, 29 are located within the area studied earlier, which provides an opportunity to extract additional information from the mean monthly charts that appeared in our 1981 "Provisional Climatology". Tables 1 and 2 provide this information.

Table 1 provides a measure of Gulf Stream[1] variability as determined by measuring the perpendicular distance from each light or buoy listed seaward to the mean inshore edge of the Stream. This was done for every month for which data were available. An annual average variability and range of variability with standard deviation were determined. Several comments appear worthwhile. One may note that the greatest variability occurs in the region south of the lower Florida Keys, becomes progressively less as the Stream rounds southeast Florida, reaches a minimum off Palm Beach, then increases to a secondary maximum near Frying Pan Shoals, and finally decreases somewhat as the Stream begins to round Cape Hatteras. Our experience, now based upon 7 yr of daily Gulf Stream System analyses, indicates that the great variability near the lower Florida Keys

[1]The term "Gulf Steam" here is meant to include the Florida Current also.

Table 1.--Variability of the location of the inshore edge of the Gulf Stream along the Atlantic Coast determined by reference to coastal lights or buoys. Units are nautical miles.

NAVIGATION LIGHT OR BUOY					AVERAGE VARIABILITY mi	RANGE OF VARIABILITY mi	STANDARD DEVIATION
Dry Tortugas Light					68	29 - 91	18
Rebecca Shoal Light					58	23 - 73	14
Cosgrove Shoal Light					51	16 - 62	15
Sand Key Light					47	15 - 59	14
Sombrero Key Light					36	12 - 45	11
Elbow Reef Light B					25	15 - 39	8
Fowey Rocks Light					19	22 - 32	6
Port Everglades Lighted Whistle Buoy 1					17	10 - 27	7
Hillsboro Inlet Light					17	10 - 27	6
Lake Worth Inlet Lighted Bell Buoy 2LW					16	10 - 26	5
St. Lucie Entrance Lighted Whistle Buoy 2					15	9 - 23	4
Fort Pierce Inlet Lighted Whistle Buoy 2					17	9 - 24	5
Sebastian Inlet North Jetty Light					21	10 - 32	7
Southeast Outer Shoal Lighted Bell Buoy 2					26	15 - 38	8
Ponce de Leon Inlet Lighted Bell Buoy 2					29	16 - 51	10
St. Augustine Lighted Whistle Buoy St. A.					37	29 - 66	11
St. Johns Lighted Whistle Buoy 2 St. J.					39	29 - 63	10
St. Marys Entrance Lighted Whistle Buoy STM 1					39	32 - 57	8
Brunswick Lighted Whistle Buoy 2B					40	32 - 54	8
Sapelo Lighted Whistle Buoy 2S					41	30 - 53	7
Savannah Light					41	33 - 58	8
Hunting Island Lighted Whistle Buoy "6H1"	32°	12.5'N	80°	19.5'W	41	33 - 60	8
Charleston Lighted Whistle Buoy "2C"	32°	40.7'N	79°	42.9'W	41	31 - 55	8
Weather Buoy 41004	32°	38.0'N	78°	42.0'W	46	34 - 63	10
"North Point" Loran Position 7980 Y-45100 7980 Z-59650	32°	30.0'N	78°	03.2'W	57	31 - 74	14
Frying Pan Shoals Light	33°	29.1'N	77°	35.4'W	58	33 - 81	17
New River Inlet Lighted Whistle Buoy "NR"	34°	30.9'N	77°	20.4'W	56	26 - 75	14
Cape Lookout Lighted Bell Buoy 14	34°	18.4'N	76°	24.4'W	51	31 - 59	10
Ocracoke Inlet Entrance Lighted Buoy "OC"	35°	02.2'N	76°	00.5'W	44	30 - 51	8

is the result of the influence of the Gulf of Mexico Loop Current upon the Stream as it enters the Straits of Florida. When the Loop Current intrudes far into the Gulf of Mexico, the southward flow in the eastern Gulf of Mexico forces the main current far south in the western Straits of Florida, to often near the coast of Cuba. Often such a deep intrusion results in the typical detachment of a large cut-off warm eddy (that drifts slowly westward), the main current returns to a location closer to the Keys. This effect of the Loop Current is greatest at the entrance to the Straits of Florida and becomes progressively less as one proceeds eastward. The minimum variability as the Stream rounds southeast Florida is due to the confinement of the flow between Florida and the Cay Sal and Bahama banks.

In developing the annual average variability of the location of the Gulf Stream, the variability appears somewhat greater during the months of October through April (average 48 mi) than during the months of May through August (average 37 mi). This may be due to the lighter winds of summer, but we are by no means certain.

Table 2 shows the average width of the Gulf Stream as determined by measuring the minimum distance between the mean inshore and offshore edge positions along a line drawn from each light or buoy wherever the mean monthly charts showed both edges of the stream. No width can be determined south of Sebastian Inlet because the offshore edge of the Stream is not observed frequently enough in these more southern latitudes. Between Southeast Outer Shoal and Cape Lookout (28.5°N to 34.5°N) the average width of the Gulf Stream is 59 mi with a range of width from 51 to 63 mi, based upon analyses from December through June, with a somewhat longer period of analyses in the latitudes north of Charleston. The width of the Stream appears to be significantly greater than the average during the months of March and April, and significantly less than the average during January and February, and we speculate that this is due to the seasonal changes in air masses. In January and February, very dry air permits us to observe the very faint thermal boundaries near the axis of the Stream. Later in the spring more moist air masses obliterate these boundaries from the imagery, permitting only the stronger thermal boundaries, further from the axis of the Stream, to show. The monthly variations in width are not correlated with monthly surface current variability (Stommel, 1966) nor with volume transport variability (Niiler and Richardson, 1973).

References:
Stommel, H., The Gulf Steam, 2nd Ed., p. 144. Univ. of California Press, Berkeley and Los Angeles, Calif., 1966.

Niiler, P. and W.S. Richardson, Jr., Seasonal Variability of the Florida Current, J. Marine Resources, 31, 144-167, 1973.

Table 2.--Width of the Gulf Stream along the Atlantic Coast determined by reference to coastal lights or buoys. Units are nautical miles.

NAVIGATION LIGHT OR BUOY					JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVG
Sebastian Inlet North Jetty Light					58	58	—	65	—	55	—	—	—	—	—	60	(59)
Southeast Outer Shoal Lighted Bell Buoy 2					58	56	64	74	62	54	—	—	—	—	—	57	61
Ponce de Leon Inlet Lighted Bell Buoy 2					52	56	64	74	56	53	—	—	—	—	—	64	60
St. Augustine Lighted Whistle Buoy St. A.					50	54	70	69	63	54	—	—	—	—	—	64	61
St. Johns Lighted Whistle Buoy 2 St. J.					54	51	72	67	67	55	—	—	—	—	—	65	62
St. Marys Entrance Lighted Whistle Buoy STM 1					57	50	72	67	67	59	—	—	—	—	—	67	63
Brunswick Lighted Whistle Buoy 2B					57	50	72	66	67	59	—	—	—	—	—	67	63
Sapelo Lighted Whistle Buoy 2S					55	48	74	62	62	59	—	—	—	—	—	65	61
Savannah Light					55	46	67	61	60	62	—	—	—	—	—	60	59
Hunting Island Lighted Whistle Buoy "6H1"	32°	12.5'N	80°	19.5'W	54	44	65	60	59	62	—	—	—	—	—	56	57
Charleston Lighted Whistle Buoy "2C"	32°	40.7'N	79°	42.9'W	60	42	61	63	56	61	—	—	—	—	66	53	58
Weather Buoy 41004	32°	38.0'N	78°	42.0'W	53	47	60	63	55	60	—	—	—	—	66	59	58
"North Point" Loran Position 7980 U-45100 7980 Z-59650	32°	50.0'N	78°	03.2'W	49	47	65	58	52	60	67	—	—	—	64	54	57
Frying Pan Shoals Light	33°	29.1'N	77°	35.4'W	34	50	61	65	61	63	62	—	—	—	62	48	56
New River Inlet Lighted Whistle Buoy "NR"	34°	30.9'N	77°	20.4'W	35	55	71	63	66	61	55	—	—	32	54	43	54
Cape Lookout Lighted Bell Buoy 14	34°	18.4'N	76°	24.4'W	37	55	63	58	62	59	67	—	—	26	49	36	51
Ocracoke Inlet Entrance Lighted Buoy "OC"	35°	02.2'N	76°	00.5'W	33	55	—	54	—	57	—	—	—	22	45	30	(42)
AVERAGE WIDTH (all points)					50	51	67	64	61	58	(63)	—	—	(27)	58	56	(58)
AVERAGE WIDTH (without Sebastian Inlet and Ocracoke Inlet)					51	50	67	65	61	59	—	—	—	—	—	57	59

Note: Parentheses indicate sparse data, i.e., less than 8 months or fewer than 26 reference locations.

GREAT LAKES NAVIGATION SEASON, 1982

Elwyn E. Wilson
National Environmental Satellite,
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Washington, DC 20235

The opening of the 1982 Great Lakes - St. Lawrence Seaway navigation season was hampered by heavy ice conditions in several areas. Adverse economic forces were also involved. The usual opening data of April 1 or earlier was delayed until April 5 for transits through the Seaway and Welland Canal.

The Liberian tanker STOLT CASTLE (fig. 1) was the first vessel to enter the Seaway at Montreal upbound on April 5. The downbound traffic was lead by the Canadian Laker LAWRENCECLIFFE HALL on the 5th. She had wintered on the upper St. Lawrence with a cargo of wheat.

Figure 1.--The STOLT CASTLE opened the 1982 season at Montreal on April 5. This photograph was taken on the fourth of eight trips between the Great Lakes and the North Sea. Photo by Albert G. Ballert, Great Lakes Commission.

Figure 2.--The LAKE WABUSH entering the Welland Canal at Port Colborne on July 6. She was carrying 1,194,000 bushels of barley. Photo by Albert G. Ballert, Great Lakes Commission.

The Welland Canal (fig. 2) opened on the 5th with the upbound passage of the Canadian ALGOBAY. The STOLT CASTLE was the first saltie upbound on the 8th. The FRANKCLIFFE HALL from Lake Erie was the first downbound to completely transit the canal on April 10. Several ships had exited the canal earlier but they had wintered in the canal.

The Soo ship canal and locks opened for traffic on April 1 but the first transit by a laker was not until the 9th when the American BENJAMIN F. FAIRLESS passed upbound. The Canadian GOLDEN HIND passed upbound on the 10th and was the first laker downbound on the 15th. The Greek saltie DIMITRIS L.F. passed through the Soo upbound on the 14th. Earlier on the 6th the Coast Guard's KATMAI BAY and MACKINAW transited the Soo. The Canadian Soo opened on April 23.

There had been some traffic in late March when the AMOCO WISCONSIN and TEXACO WARRIOR delivered cargoes but did not pass through the locks. On April 1 the AMOCO WISCONSIN and S.T. CRAPO needed ice breaking assistance in the Straits of Mackinac when wind driven ice plugged the Straits.

The official closing date for the Soo Locks and the St. Lawrence Seaway was December 15. Five vessels were reported to have been late at the upbound check-in point and six at the downbound check-in point of the Seaway. All had to pay fines. LAWRENCECLIFFE HALL was the last ship downbound through the Seaway. The Welland was scheduled to close on December 24. The NORDIC SUN was the last saltie through on the 14th. The laker BAIE ST. PAUL was the last transit on December 23. The AMERICAN MARINER made the final transit of the season through the Soo on December 26.

Precipitation averaged 34.39 in over the Great Lakes basin and was 8 percent above the long term average of 31.82 in (table 3). Precipitation has been above average for 8 of the last 10 years, 1974 and 1976 were below average. The Lake Ontario basin was the only one below the 1900-82 average. The Lake Superior basin was 20 percent above average.

Table 3.--Annual precipitation data (in)

Precipitation in inches	Gr. Lakes Basin	Lake Superior	Lake Michigan	Lake Huron	Lake Erie	Lake Ontario
1900-82 avg.	31.82	29.88	31.42	31.57	34.18	34.65
1982	34.39	35.82	32.86	34.34	36.67	31.42
1982 % avg.	+8	+20	+5	+9	+7	-9

NATIONAL WEATHER SERVICE

As in previous years, the National Weather Service (NWS) conducted the marine weather program in 1982 from four Weather Service Forecast Offices (WSFO's) and ten smaller Weather Service Offices in the Great Lakes region. Products and services included weather warnings, forecasts and advisories and statements; ice forecasts and outlooks; low water statements, and lake shore warnings and statements.

Lakes Superior and Michigan saw a substantial

increase in the number of Gale and Storm occurrences in 1982, while the totals for the lower lakes remained about the same as last year. Most of the increase occurred in January which was an unusually active period for Gales and Storms (table 4).

Table 4.--1982 Great Lakes gale and storm warnings

Month	Superior G	Superior S	Michigan G	Michigan S	Huron G	Huron S	St. Clair G	St. Clair S	Erie G	Erie S	Ontario G	Ontario S
January	13	5	11	5	7	2	6	0	6	3	-	-
February	1	0	3	0	2	0	0	0	3	0	-	-
March	6	2	6	2	2	1	1	0	3	0	-	-
April	3	1	4	1	3	1	1	0	2	0	3	0
May	0	0	0	0	0	0	0	0	0	0	0	0
June	0	0	0	0	0	0	0	0	0	0	0	0
July	0	0	0	0	0	0	0	0	0	0	0	0
August	2	0	1	0	0	0	0	0	0	0	0	0
September	2	0	1	0	0	0	0	0	0	0	0	0
October	4	0	3	0	3	0	1	0	2	0	1	0
November	8	3	7	1	3	1	1	0	2	0	1	0
December	8	2	6	1	5	1	1	0	4	1	1	0
TOTALS	47	13	42	10	25	6	11	0	27	5	8	0

Total Gale and Storm warning issued last 10 yr.

1982 - 194	1981 - 136	1978 - 241	1975 - 276
	1980 - 173	1977 - 262	1974 - 301
	1979 - 227	1976 - 399	1973 - 401

In June, instructions were issued to NWS forecast offices concerning revised procedures for upgrading, downgrading, and canceling warnings; and new guidance on preparing MAFOR messages. Also added in 1982 was the option of reducing lake forecasts to two issuances per day during periods of suspended mid-winter navigation.

During the year, several meetings were held with Lorain Electronics Corp., to establish weather broadcast schedules and procedures for transmitting unscheduled weather messages. A plan is now in effect that will ensure the swift flow of weather observations to NWS forecasters and rapid dissemination of warnings and advisories to the Great Lakes marine community.

The establishment of a Great Lakes Services Center, for consolidating the marine programs of several NWS forecast offices, is a major initiative in a NOAA ocean services improvement plan that will be considered in future budget requests. In the meantime, NWS will provide marine warnings, forecasts, data and information services via its WSFO's in Buffalo (Lake Ontario), Cleveland (Lake Erie), Ann Arbor (Lakes Huron and St. Clair), and Chicago (Lakes Michigan and Superior). WSFO Ann Arbor will continue to be responsible for ice services for the entire region during the winter.

OBSERVATION PROGRAM

The National Climatic Data Center reeceived only 3,240 observations from only 26 ships this season (table 5). This was less than half the ships participating and over 11,000 fewer observations than last year. The 3,240 observations indicated an average of synoptic observations from only three ships per day. This is at least partially a result of many layups. As usual Lake Superior had the most observations -- 1440. June had the highest number of observations at 626.

Table 5.--Total count of ship observations for 1982

LAKE	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTALS
Ontario		6		1									7
Erie				5	11	35	25	27	20	14	29	14	180
Huron				24	73	172	123	133	127	90	106	50	902
Michigan				6	131	172	105	28	26	63	111	69	711
Superior			1	46	89	247	195	250	347	189	123	43	1440
TOTALS		6	1	82	306	626	448	450	420	356	369	176	3240

Total number of ships reporting 26

Table 6 shows a breakdown of the numbers of selected data observations. There were more observations for low visibilities than any other criteria. Tables 7, 8, and 9 shows the distribution of high winds and seas. June had the most observations for visibilities less than 2 mi and Lake Superior headed the lake list both in number of observations and the proportion with low visibilities.

The highest waves logged on the Great Lakes Observations Form were 16 ft on Lake Michigan and the highest winds were 60 kn on Lake Superior.

This article and the tables include only those weather observations logged on the Ship's Weather Observation Form 72-1A (GL) and forwarded to the National Climatic Data Center.

Table 6.--Summary of selected data

	Winds	Visibility	Severe WX	Sea heights	
Selection Criteria	>30 Knts	Code < 96	Code=13,17-19,24, 27,29,57 or > 86	Code=8-12 (12 to 20 ft)	Code >12 (>20 ft)
Total # of obs	133	337	44	4	1

Table 7.--High wind speed distribution (kn)

LAKE	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTALS
Ontario													
34-40													
41-47													
48-55													
56-63													
Erie													
34-40										1	3		4
41-47										1	2		3
48-55													
56-63													
Huron													
34-40							1		2	6	3	5	19
41-47										1	2		3
48-55										1	1		2
56-63													
Michigan													
34-40										7	8	3	18
41-47												1	1
48-55													
56-63													
Superior													
34-40						1			3	11	11	2	28
41-47								1	1		2		4
48-55											1		1
56-63										1			1
Totals													
34-40						1	1		5	25	27	10	69
41-47								1	1	2	6	1	11
48-55										1	2		3
56-63										1			1

Table 8.--Waves over 12 ft

Lake	Ship	Date	Height (ft)
Michigan	PAUL H. TOWNSEND	Nov. 10	16
Superior	ARTHUR M. ANDERSON	June 14	13
	ERNEST R. BREECH	Oct. 11	15
	PHILIP R. CLARKE	Nov. 21	15

Table 9.--Highest 1-min wind (kn) reported on the Great Lakes by U.S. Anemometer-equipped vessels.

Year	Lake Erie		Lake Huron		Lake Michigan		Lake Superior		Lake Ontario	
1941	W	42	WSW	50	NW	45	NNW	64	--	--
1942	WSW	52	WSW	56	WNW	48	S	48	--	--
1943	WSW	57	WNW	63	NNW	56	WNW	58	--	--
1944	NE	38	NW	57	WSW	46	NNE	45	--	--
1945	WNW	52	NNW	54	WNW	49	NW	52	--	--
1946	SW	50	W	46	S	44	NW	47	--	--
1947	NW	51	SSE	49	ENE	39	WSW	45	--	--
1948	WSW	48	NNW	51	NW	45	WSW	48	--	--
1949	W	53	NNE	50	NNW	43	N	52	--	--
1950	SW	70	NW	48	NW	45	NW	81[1]	--	--
1951	WSW	37	WSW	50	SW	48	WSW	54	--	--
1952	SW	48	NW	57	NNW	44	WSW	45	--	--
1953	WSW	48	NW	45	NNW	45	ENE	50	--	--
1954	W	45	NW	48	E	48	N	43	--	--
1955	W	52	SW	57	WSW	56[1]	NW	48	--	--
1956	WSW	48	W	43	SSW	46	N	50	--	--
1957	WSW	72	SW	54	WSW	45	W	47	--	--
1958	SW	61	WSW	63	SW	52	SSW	54	--	--
1959	W	48	NE	50	E	45	W	54	--	--
1960	NE	56	WSW	49	NW	56	N	54	--	--
1961	W	50	NW	47	NW	48	N	57	--	--
1962	NW	53	WNW	63	NW	48	NNW	60	--	--
1963	NNW	74	NW	60	N	58	NNW	52	E	35
1964	WSW	60	W	72	NW	54	WSW	62	WNW	58[1]
1965	WSW	66	WNW	96[1]	ENE	52	SW	70	W	48
1966	ENE	49	NE	69	NW	57	NNE	61	W	38
1967	WSW	43	W	54	ENE	55	N	58	W	32
1968	W	61	NNW	44	WNW	48	NNE	55	SW	31
1969	WSW	44	NNW	48	NW	50	SSW	50	--	--
1970	W	52	W	63	NW	52	W	62	--	--
1971	SW	38	N	33	N	30	SW	58	--	--
1972	W	45	NW	58	N	34	NNE	60	--	--
1973	SW	45	ENE	44	NE	36	NE	50	--	--
1974	ENE	48	SW	47	SW	43	ENE	44	W	38
1975	NE	48	WSW	60	SW	54	W	50	NW	35
1976	W	46	S	36	NNW	36	NE	54	W	34
1977	WNW	44	SE	49	ENE	44	SW	58	NW	38
1978	SSW	80[1]	ENE	58	N	55	S	64	WNW	58
1979	W	42	W	44	WNW	35	NNE	52	W	36
1980	NNE	54	N	58	NNE	46	S	58	--	--
1981	W	55	NW	59	NW	50	ENE	58	SSE	37
1982	W	43	W	53	NW	42	N	60	--	--
1983										
1984										
1985										

[1]Highest for each lake

NOTABLE WEATHER HAPPENINGS

Lake Superior was the stormiest lake, as usual. Although the highest wind was in October it appears that November should be considered the stormiest month. The highest waves occurred in November and there were more winds in the higher categories.

August had the most reports that fit the severe weather category such as thunderstorms, lightning, etc. There were more observations on Lake Superior.

This data and the number of observations must be evaluated in terms of the season and number of ships operating. Some of the most severe storms are likely to occur during the late fall and winter months when very few boats are operating.

The following paragraphs describe some of the more significant weather as indicated by the observations. Canadian ships and ships that do not forward their observations to the National Climatic Data Center may have experienced heavier weather and other storms as severe. January, February, and March are covered only briefly. Tracks of the centers of the more severe storms are shown on figure 3.

JANUARY - FEBRUARY - MARCH

Although most lakers go into layup a few boats, barges and tugs still operate. The MOTHY was holed by ice in the lower St. Lawrence River. The MOBILE BAY and BISCAYNE BAY worked through 8-ft ice in the vicinity of the Straits of Mackinac.

A strong 970-mb storm passed over the Lakes on January 9, 10, and 11 (fig. 4). Record low temperatures were set in many cities including minus 36°F at Sault Ste Marie. Winds gusted to 58 mi/hr. Gale and storm warnings were posted for all the Lakes. Buffalo had 25 in of snow in 24 hr with wind gusts over 50 mi/hr. Storm and

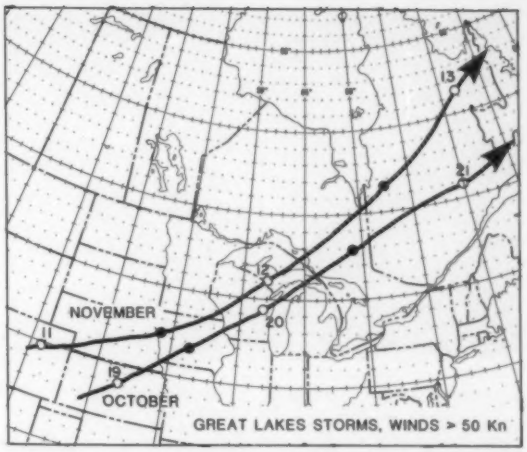


Figure 3.--Tracks of storms with winds over 50 kn and/or waves over 15 ft.

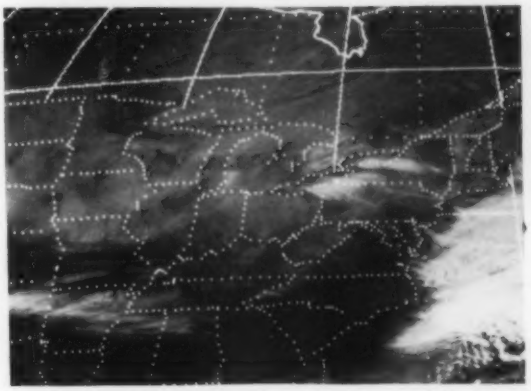


Figure 4.--The storm was centered near the southern tip of James Bay at 1700 on the 10th. At 1200 the pressure was 970 mb.

blizzard warnings were again issued on the 15th and 16th.

The 22d and 23d brought another winter storm with the winds at Buffalo gusting to 64 mi/hr.

In February the BADGER broke the tug DONALD HANNAH free from ice off Ludington, Mich. On February 6, O'Hare Airport at Chicago set new lowest minimum temperature records for the minimum, maximum, and mean for the day.

In March the weekend of the 13th and 14th brought wind gusts up to 73 mi/hr to Marquette, Mich. (fig. 5). High winds were reported over a large area with gale and storm warnings for the lakes. The last two days of the month brough more gale and storm warnings. Buffalo again had gusts to 58 mi/hr. The tanker LAKESHELL leaked bunker fuel in the St. Lawrence from a crack resulting from striking an ice floe.

APRIL

There were a lot of ice problems in early April as the season opened on the Lakes and the St. Lawrence Seaway. The RICHARD J. REISS

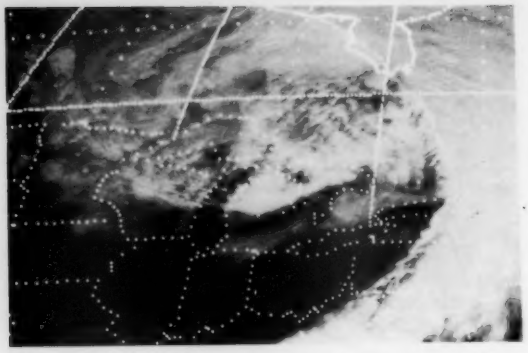


Figure 5.--Marquette, Mich. is due south of the center of the storm at 1700 on the 13th.

suffered a 28 in long crack at the waterline on the 8th in the Straits of Mackinac. The TADOUSSAC sufffered an 18-ft gash from ice on Lake Superior while entering into the Soo. The AMOCO WISCONSIN and S.T. CRAPO needed assistance in the plugged Straits of Mackinac on the lst.

The first storm of this month had already passed over the lakes when the season officially opened. The storm formed over Montana on the lst. By 1200 on the 3d it was 965 mb near Green Bay (fig. 6). All time record low-pressure

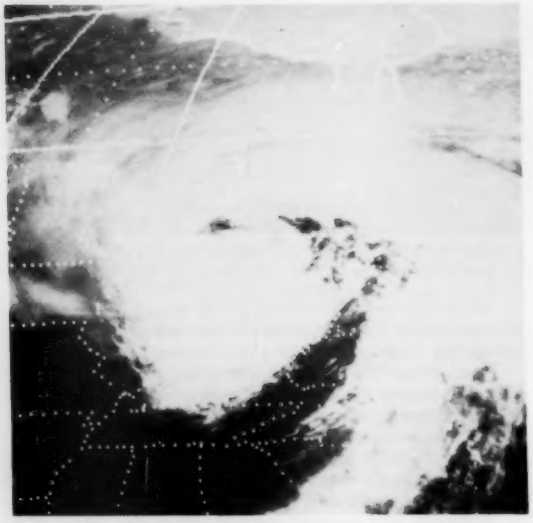


Figure 6.--Frozen over Hudson Bay shows very clear. The clouds are much brighter due to a higher Sun angle.

records were set at Green Bay and Milwaukee, Wisc., and Rockford Ill. Storm warnings were in effect for Lakes Michigan and Superior, and gales for Lakes Erie and Huron. By midnight winds were 60 mi/hr at Muskegon, Mich. and 80 mi/hr at Grand Rapids. Snow resulted in blizzard conditions. Early on the 4th the LOW was over Ontario and the winds gradually shifted to the northwest. Record low temperatures were recorded the morning of the 5th; minus 2°F at Saulte Ste Marie. Late that day another LOW passed eastward south of the lakes leaving up to a foot of new snow with 45 mi/hr winds at Milwaukee and 65 mi/hr at Erie, Pa. With this snow Muskegon, Mich. broke their previous snow fall record with 173 in for the winter. Cleveland, Ohio also broke their 90 in.

This was a multicentered storm over the Great Plains on the 16th. As it moved across the Lakes on the 17th it consolidated into a 998-mb center at 1200. A waterspout was reported over western Lake Ontario. By 1200 on the 18th the storm was east of James Bay. The GEORGE M. HUMPHREY reported 33-kn westerly winds on Lake Huron on the edge of the storm.

MAY

This was a quiet month on the Great Lakes. There were no winds of 30 kn or greater reported by participating ships. There were two reports of thunderstorms, one heavy. The EDGAR B. SPEER reported the heavy storm on Lake Michigan on the 6th. The JOHN G. MUNSON reported a thunderstorm on the 11th on Lake Superior. On the 16th, the PHILIP R. CLARKE reported a funnel cloud on Lake Superior while east of Copper Harbor. Lake Michigan was quite foggy. The EARNEST R. BREECH reportedly went aground in fog on the 25th near Marine City, Mich. (fig. 7). The SENATOR OF CANADA grounded off Round Island at the Soo in dense fog on the 30th.

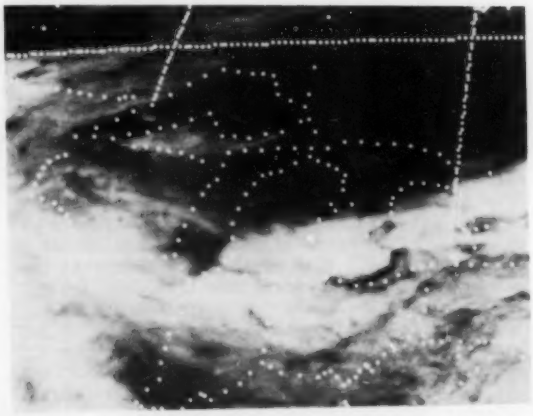


Figure 7.--The EARNEST R. BREECH went aground in the St. Clair River which was under clouds at 1700, but fog can hopefully be seen over Lake Huron.

JUNE

June was slightly more active weather-wise than May. There were frequent passages of LOWs, frontal waves, and fronts but they were basically weak and of no concern to large boats. Fog was probably the biggest concern as this was the foggiest month of the year, particularly on Lake Huron (fig. 8). This was a cool month with record cold temperatures set at various cities on five mornings. Sault Ste Marie dropped to freezing as late as the 18th. There were four reports of squalls this month, on the 7th, 12th, 17th, and 22d. They were reported by the EARNEST R. BREECH, PHILIP R. CLARKE, and GEORGE M. HUMPHREY on Lakes

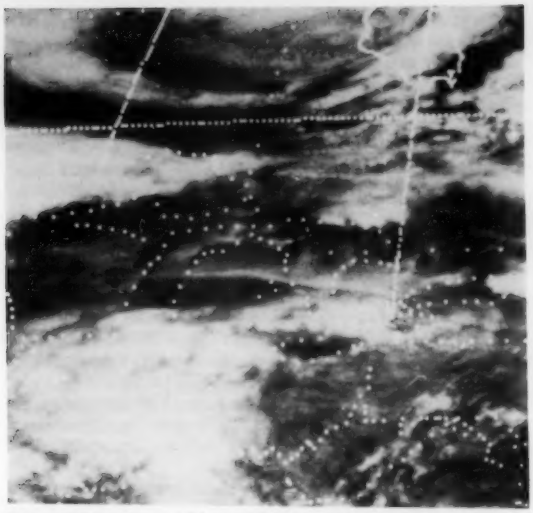


Figure 8.--This 1700 satellite image shows fog on Lakes Michigan and Huron. The EDGAR B. SPEER reported code 90 visibility at 1800 on the 28th on Lake Michigan.

Huron and Superior. The ARTHUR M. ANDERSON found 13-ft waves on Lake Superior on the 14th. The highest wind was 38-kn out of the west over central Lake Superior on the 11th by the WILLIAM CLAY FORD.

JULY

The only significant LOW this month moved over the basin on the 11th. The month ranked second in low visibility reports. The weather was mostly influenced by air mass stability rather than fronts or LOWs. There were ten reports of thunderstorms or lightning with the majority on Lake Superior. I suspect this was more the result of traffic than meteorological considerations. The highest wind was 38 kn on Lake Huron on the 11th. The LOW on the 11th developed out of a weak system that came out of the Rocky Mountains. At 0000 it was 1000 mb near Milwaukee. At 1200 it was 992 mb over the Straits of Mackinac. At 1800 the JOHN G. MUNSON was east of Alpena with 38-kn southerly winds. The ERNEST R. BREECH southeast of Alpena had 31 kn. The storm was moving slowly northeastward and there were thunderstorms reported near Lake Ontario. By 1200 on the 12th the circulation had moved out of the area. There was good weather on the 7th as the AKRANES (fig. 9) sailed toward Chicago.

AUGUST

August had the second largest total of weather reports and the largest of any month from Lake Superior. Also the highest number of severe weather reports. The storm systems were relatively weak as would be expected as the deeper LOWs tracked further north. There were only two reports of winds of 30 kn or greater, one being 41 kn. There was frost around the upper lakes as early as the 11th and several locations established record low temperatures for the month the morning

Figure 9.--The Icelandic freighter AKRANES enroute to Chicago had excellent weather on the 7th. During 1982, 532 vessels from 41 countries made 815 overseas trips into the Lakes.

of the 29th. Cadillac, Mich. dropped to 26°F and Sault Ste Marie to 29°F. The 41-kn westerly wind was reported by the BURNS HARBOR on Lake Superior west of Copper Mine Point on the 9th. The WILLIAM CLAY FORD was washed by a thunderstorm on Lake Huron on the 4th. The JOHN DYKSTRA found thunderstorms on Lake Superior on the 29th, probably set off by the instability of cold air over the warm water. Most of the other severe weather reports were for lightning.

SEPTEMBER

The weather started to intensify this month. The gradients were generally tighter. There were fewer thunderstorm and lightning reports. The highest wind report was 46 kn on western Lake Superior late on the 2d. Low visibilities were becoming less of a problem but fog was a serious problem on the 11th through 14th and 25th and 26th. The ATLANTIC SUPERIOR ran aground in the American Narrows of the St. Lawrence Seaway early on the 29th in heavy fog and swift currents.

The major storm of the month developed over Lake Winnipeg on the 1st. On the 2d there was a front over and parallel to Lake Erie. The LOW was north of Thunder Bay at 1200. The GEORGE A. STINSON was near Duluth at 0600 with a heavy thunderstorm. The BURNS HARBOR was east of Copper Harbor at 1800 and measured the 46-kn winds. No weather was indicated on the report. Later in the afternoon thunderstorms tore the roof off a house and destroyed a trailer near lower Lake Huron. There were wind reports near 30 kn on Lakes Erie, Huron, and Superior on the 3d. The LOW had incorporated the front in its circulation. It drifted slowly out of the area on the 4th.

A weak front was over Lake Superior on the 12th and generated thunderstorms. The same front was south of the Lakes on the 15th and there were northeast winds of over 30 kn over Lakes Huron and Superior in a tight gradient between the front and a 1036-mb HIGH.

OCTOBER

The weather over the Great Lakes continues to deteriorate into winter weather. The storm systems pass closer to the Lakes and are deeper.

There were few low visibility reports and the only thunderstorm type reports were over Lake Huron. The number of weather reports continued to decrease with more reports on Lake Superior than the other lakes added together. The first half of the month was quiet weather-wise. Three ships reported winds over 30 kn on the 6th on Lake Superior as a LOW moved northward west of Duluth. Easterly flow had persisted over Lake Superior for 48 hr and at 0000 on the 11th the ERNEST R. BREECH found 15-ft waves.

On the 14th a front trailed out of a LOW over northern Hudson Bay. There were rain showers over the Lakes. At 1800 the BURNS HARBOR measured 32-kn southwesterly winds on Lake Michigan. The 0000 chart of the 15th showed a frontal wave had formed over James Bay. At 0600 the ERNEST R. BREECH measured 41-kn, which dropped to 37 kn at 1200 with heavy rain on Lake Erie. The G.M. HUMPHREY had gales on both Lakes Michigan and Superior. The LOW traveled eastward with light northwest winds over the basin on the 16th.

This LOW formed in the lee of the Rocky Mountains on the 19th. It was on this date that the famous Great Lakes storm of 1844 occurred. Hurricane-force winds out of the southwest blew for 5 hr driving water into downtown Buffalo drowning 200 persons. This storm deepened rapidly and was 995 mb near Green Bay at 1200 on the 20th (fig. 10). Several ships had multiple gale-force

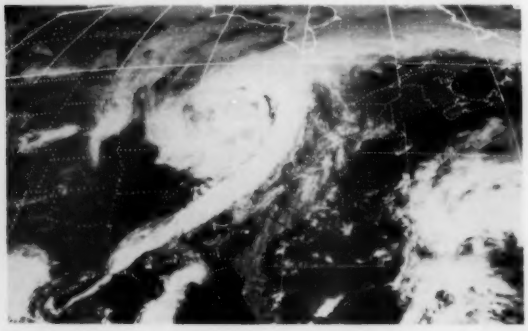


Figure 10.--Looking like a winter storm, it was over Lake Michigan at 1700.

wind reports on the 20th. Three ships had winds of 40 kn or greater. At 1800 the BURNS HARBOR was sailing eastward on Lake Superior when she was struck by 60-kn northerly winds with moderate snow showers. Six hours later they were only 38 kn. Winds of 43 mi/hr were measured at the Buffalo Airport. At 0000 on the 21st the storm was near North Bay, Ontario at 998 mb. The JOHN DYKSTRA had the third highest wind of the season 52 kn - on Lake Huron. The waves were 12 ft. The storm had moved out of the area by late in the day.

This storm consolidated over North Dakota, on the 28th, from a series of frontal waves on a north-south front. The BURNS HARBOR on Lake Michigan measured 40-kn winds out of the south and southwest for over 12 hr on the 29th. The LOW was north of Duluth at the time. The WE8810 measured 31 kn southerly winds on Lake Huron. The LOW continued to deepen but was too far north to affect the Lakes.

NOVEMBER

This is always a bad month on the Great Lakes. Generally most of the boats are still active and winter weather has started. There were more high wind reports this month than any other but not the highest wind. The highest wave of 16 ft occurred on Lake Michigan on the 10th as measured by the PAUL H. TOWNSEND. A large intense HIGH was to the north. Buoys 45001, 45004, 45006, and 45008 were recovered this month.

Some of the most destructive storms have occurred this month. On the 9th in 1913 a rapidly deepening storm caused eight ore carriers on Lake Huron to sink drowning 290 sailors. Cleveland had 22 in of snow and wind gusts to 79 mi/hr. On the 10th in 1975 the ore carrier EDMUND FITZGERALD sank in Lake Superior with the loss of the 29 crewmen. Sault Ste Marie had gusts to 71 mi/hr. On the 11th in 1940 a blizzard raged across the area. Ship wrecks on Lake Michigan resulted in 59 deaths. The barometer at Duluth dropped to 28.66 in (970 mb).

The first major storm formed over southern Utah on the 10th. By 1200 on the 12th it was 980 mb south of Marquette, Mich. Gale-force winds had started to blow on the 11th. There was a storm warning over western Lake Superior. The BURNS HARBOR had 38-kn westerly winds on Lake Superior. The PAUL H. TOWNSEND found 40-kn northwesterly winds on Lake Michigan on the 12th. By 1200 on the 13th the storm was 980 mb south of Ungava Bay with northwesterly flow over the Lakes. At 0000 the BURNS HARBOR had 53-kn winds on Lake Huron. Within the next 6 hr they decreased to 34 kn. By the 14th weak high pressure had moved over the basin.

A weak LOW moved over the basin on the 14th and 15th. The BURNS HARBOR was now on Lake Erie with 43-kn winds. The ARTHUR M. ANDERSON had 13-ft waves on Lake Superior.

This LOW came out of Montana. On the 20th it

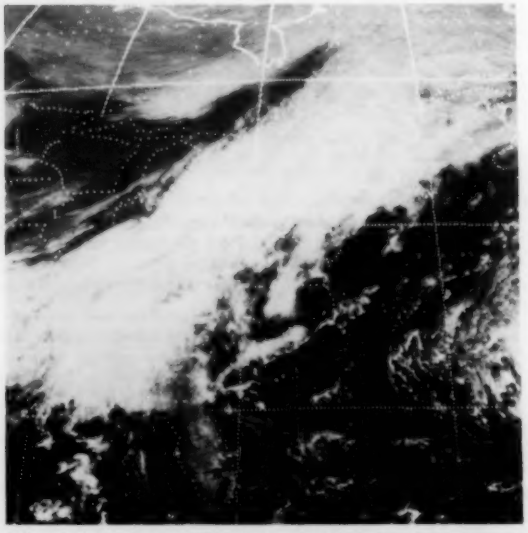


Figure 11.--Even though the skies are clear over Lake Michigan behind the front there were still strong winds.

was centered over northern Minnesota at 995 mb. The JOHN G. MUNSON had 32-kn winds from the south on Lake Michigan. The BURNS HARBOR was back on Lake Superior with 40-kn southeasterly winds. By 1200 on the 21st the 973-mb storm was over northern James Bay (fig. 11). The PHILIP R. CLARK measured 49-kn winds from the west with 15-ft waves on Lake Superior. By the 22nd the high winds had moved northeastward.

On the 24th a frontal wave was centered near Erie, Pa. There was a large HIGH over western Kansas with a tight gradient between the two pressure systems. The BURNS HARBOR found gales on Lake Michigan on the 24th and winds up to 44 kn on Lake Superior on the 25th. The GEORGE A. STINSON had 46-kn westerly winds on Lake Huron. The LOW was 984-mb at 0000 on the 25th. A frontal wave was racing eastward north of the Lakes creating higher winds as the gradient tightened temporarily.

DECEMBER

This was a month of contrasts with record warm temperatures in many places the first week and at Christmas. A cold wave on the 10th brought record cold to many areas. There was a blizzard on the 28th and 29th. Many ships were already in layup by this month. There were only 176 observations on all the lakes.

On the 13th high pressure was moving across the lakes with a complex low-pressure system over the northern high plains states (fig. 12). Late in the day the CALCITE II had southwesterly gales on Lake Michigan. The PHILIP R. CLARKE had the highest wind of the month of 42-kn on Lake Michigan. As the ship sailed south on the 14th these winds dropped to 32 kn. The MYRON C. TAYLOR had 32-kn southerly winds on Lake Erie. The GEORGE A. SLOAN found 34-kn on Lake Huron. The HIGH drifted off the East Coast and the winds relaxed.

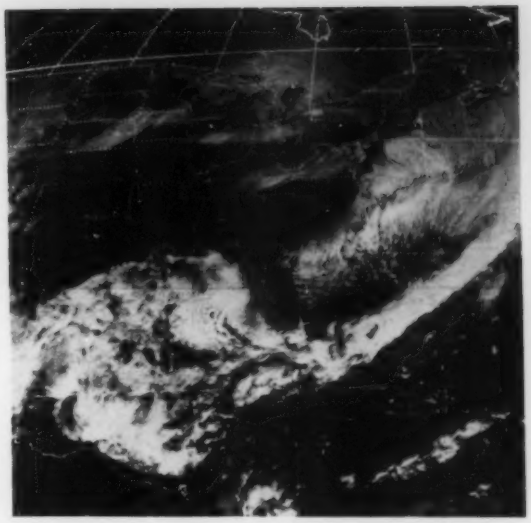


Figure 12.--At 1700 the HIGH was centered over Albany, N.Y. and a LOW had formed over Lake Superior. A low Sun angle makes the clouds look dull. The brighter spot over Niagara,N.Y. is from the southwest winds picking up moisture over Lake Erie.

There were some gales in the southerly flow as a 1036-mb slowly moving HIGH was replaced by low pressure. The winds were reported by the PHILIP R. CLARKE on Lakes Michigan and Superior on the 16th and 17th. The JOHN G. MUNSON also had 32 kn on Lake Superior on the 17th. She also had the priviledge of reporting the last gale of the season by a cooperative Great Lakes ship on Lake Huron on the 28th.

CYCLONE IN THE MEDITERRANEAN, JANUARY 1982

Rene Mayencon
Service Meteorologique Metropolitain
Chef de la Station de Toulon-La-Mitre

Reprinted from MET MAR, Ministere des Transports, Direction de la Meteorologie, France, courtesy of Rene Mayencon.

We have often shown in MET-MAR that the arrangement of clouds and winds in certain mid-latitude disturbances are quite characteristic of tropical cyclones. For this reason, we have always advised ships to apply navigation rules recommended for tropical cyclones while in these areas of severe weather. Mayencon, Chief of the Toulon Meteorological Station provided this photographic illustration of a cyclone evolving in the Mediterranean.

On January 26, 1982, the Center of Satellite Meteorology in Lannion provided information on an unusual depression in the Mediterranean presenting all the typical features of a tropical cyclone. The depression was located between Greece and Sicily near 37°N, and 19°E.

The sea-level pressure chart provided by the meteorological service center in Paris for that time and area indicated a mere, harmless depression seeming to fill. Two days earlier, on the 24th, this LOW was located near Malta with a pressure below 1000 mb, and its size was noticeably larger (compare 1010 isobars in figures 13 and 14). On the afternoon of the 26th we received the following Ship message: FNQX 26124 99372 10184 41496 80348 10116 20089 40008 57101 78022 687// 22222 00152 20408. It was transmitted at 1200 UT by the RO/RO freighter VILLE DE DUNKERQUE of the Societe Francaise des Transports Maritimes. As shown in the message, the ship's position was 37.2° N and 18.4° E, the wind was blowing from north-northeast

at 48 kn and the pressure was 1000.8 mb, after a fall of 10.1 mb within 3 hr. Such a rapid fall of pressure is hardly ever seen in Mediterranean areas.

We were very lucky to get this interesting and valuable observation near the vortex located by the satellite (37°N, 19°E), for it confirmed a typical feature of tropical cyclones, namely: the strongest winds (here storm-force 10) at the rim of the eye.

The depression moved slowly eastward losing strength gradually. On January 28 at 1200 UT the depression reached the southern part of the island of Rhodes, lowering the barometric pressure there by the 4.7 mb in 3 hr.

The satellite pictures appearing in figures 13, 14, and 15 are very informative. They show spiraling cloud bands surrounding the central eye with powerful cumulonimbus on the edges. These photographs demonstrate to what extent the marine forecasting center would be impaired without the availability of a satellite imagery receiver.

ACKNOWLEDGEMENT

The editor wishes to thank Rene Cuzon du Rest of the National Oceanographic Data Center and Vicki Jones of the National Advisory Committee on Oceans and Atmosphere for the translation.

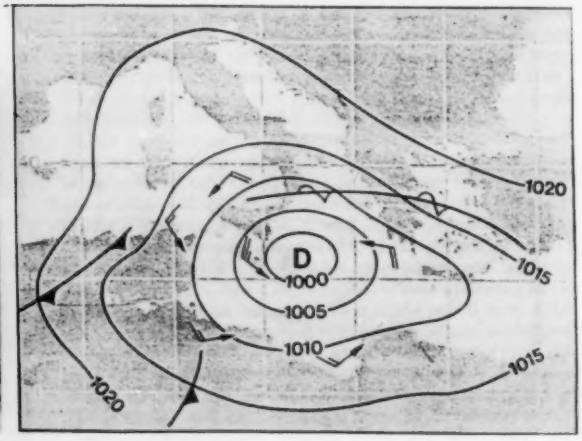
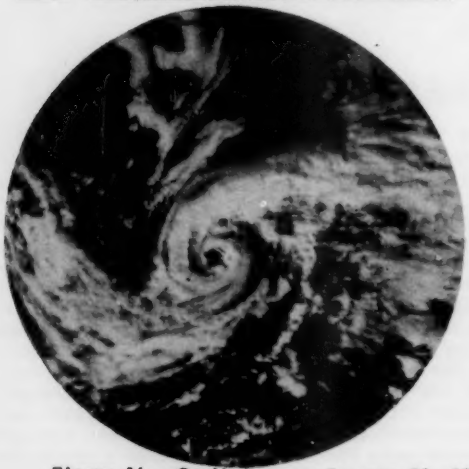


Figure 13.--Conditions on January 24, 1982 at 1200 with cloud configuration 3 hr earlier at 0900. It is worth noting that the depression was accompanied by very large cloud formations and is the center of an already well-developed large circulation on the photo from METEOSAT-2. Photo: Meteorologie Nationale-CMS Lannion.



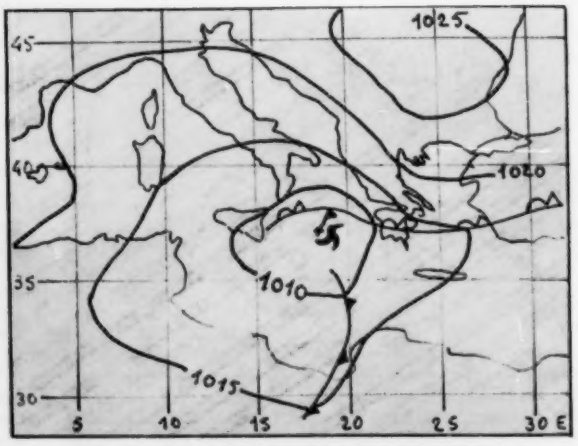


Figure 14.--Conditions on January 26, 1982 at 0600 with cloud configuration 6 hr later at 1200. The depression has shrunk noticeably. It has a good cyclonic pattern with a central eye, and powerful thunderstorms embedded in cloud spirals converging on the center as shown on this NOAA-7 satellite picture. The cross indicates the location of the ship experiencing storm winds. Photo: Meteorologie Nationale-CMS-Lannion.

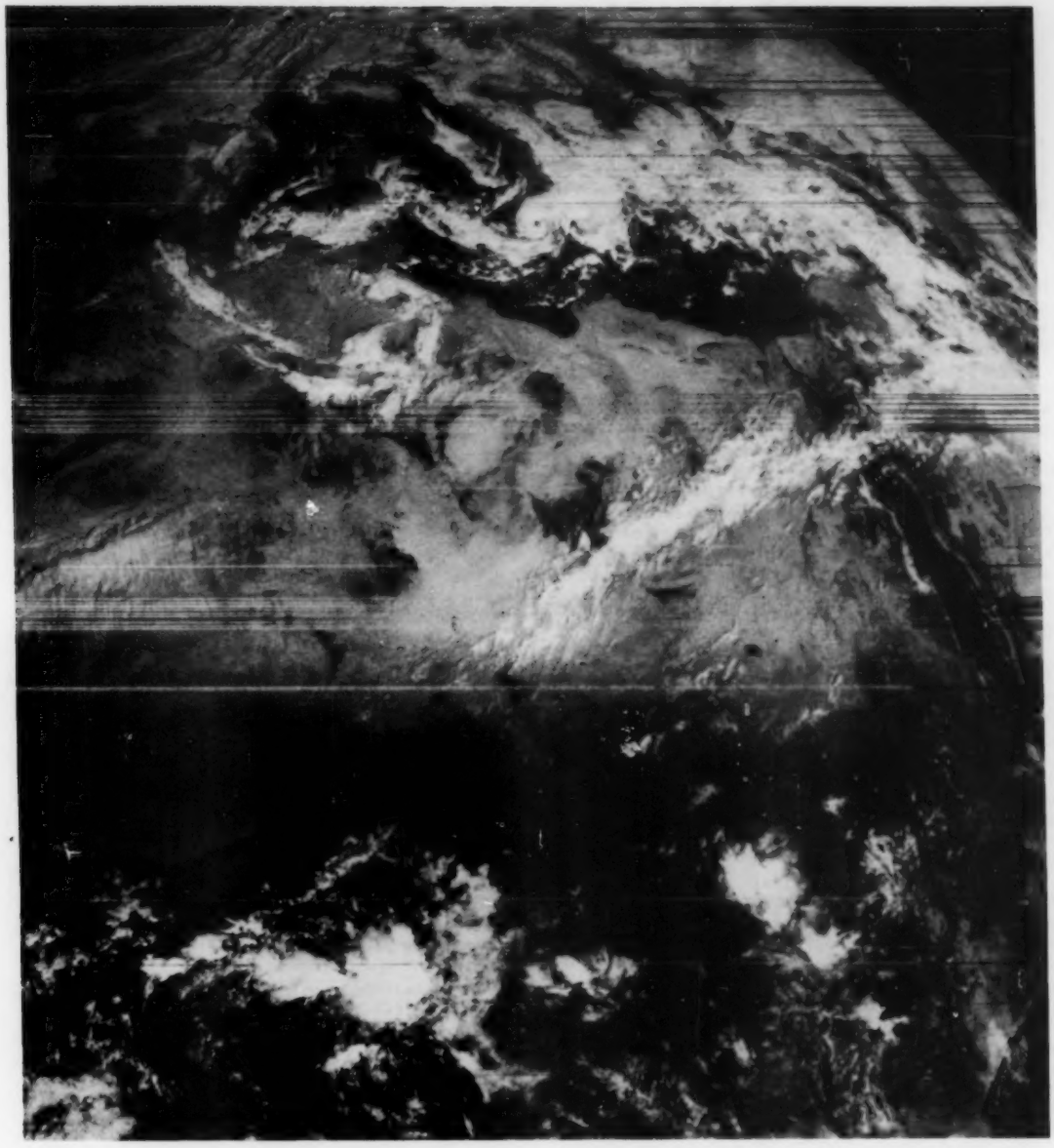


Figure 15.--Overview of conditions on January 26, 1982 at 0900. This METEOSAT-2 photograph provides a wealth of interesting meteorological and geographical details. The Mediterranean "Cyclone" is the center of interest, in this photograph. It is associated with a cloud band stretching towards Turkey and the north of Asia Minor. On the barometric pressure chart, the cloud band was depicted as a quasi-stationary front. On the African continent three dissipating cold fronts of Atlantic origin appear in succession. The tail end of the first is over the north end of the Red Sea, the second is over Libya and the third over Tunisia. Over the Gulf of Guinea, large cloud formations reveal a cyclogenic area, now located in its southern most position, corresponding to the dry season of West Africa. The clarity of the details on the photograph permit identification of some typical geographic features: The northern limit of Africa, the River Nile and its delta, the Sinai peninsula, the Dead Sea, the Red Sea, the Bab-el-Mandeb Straits, the East African Lakes, and the Tibest mountains. Photo: Meteorologie Nationale-CMS Lannion.

Marine Observations Program

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Silver Spring, MD 20910

U.S. COOPERATIVE SHIP WEATHER REPORTS

Many of you turn to this section first to see how your ship's weather reports compare to other ships, but the last few issues have held some unpleasant surprises, "Hey, our ship isn't even listed!!"

When we had the ships' names put back in the MWL something happened in the computer programming at the National Climatic Data Center (NCDC). Or, possibly the error was at headquarters in the Marine Observations Program (MOP).

The Port Meteorological Officers (PMO's) are supposed to check the lists of data that MOP sends them to assure that the data on the ships they service are correct.

MOP has the ultimate responsibility. I apologize, we will correct it as soon as possible. However, we have to depend upon the mariners to notify us directly, or through your servicing PMO, of things you like or dislike, and as in this case, of omissions. This is a cooperative effort, and believe me, we couldn't do it without you.

HURRICANES AND TYPHOONS

Over the last year there have been several letters to MOP in which the mariners felt that with all of the new computers and satellites the hurricane and typhoon advisories should have greatly improved. Well, they have. However, no amount of stroking with the implements of modern technology is going to change the stripes on those tigers. The hurricane and typhoon warnings are clearly advisories; in fact, they say just that - advisory. The action you take is your own responsibility.

By looking at any "Hurricane Alley" feature in the MWL, you can see the antics of tropical weather systems. They speed up, slow down, expand, contract, curve, recurve, and loop, among other things. In many cases they are such a powerful heat engine that they tend to take control and drive the local atmosphere. Essentially, they go where they want to within limits. The advisories and warnings provide better information each year, but the hurricanes and typhoons are constantly changing internally so you should be prepared for rapid changes in all aspects of the system.

The tried and true tropical cyclone avoidance scheme is to plot the cyclone center position and its forecast movement. Add and subtract 30° to the direction and plot these lines on the chart. Then draw an arc at the forecast distance from the center for the 50-kn winds. Take the forecast storm speed of advance (never less than 10 kn) and draw another arc for 24 hr of movement. Do this again for 48 hr. Figure 16 shows an example plot.

You, of course, must update your plot with every advisory. If your vessel is inside the 48 hr arc, you plan the various maneuvering options open to your vessel. At the 24 hr arc, you should already be maneuvering to avoid the tropical cyclone.

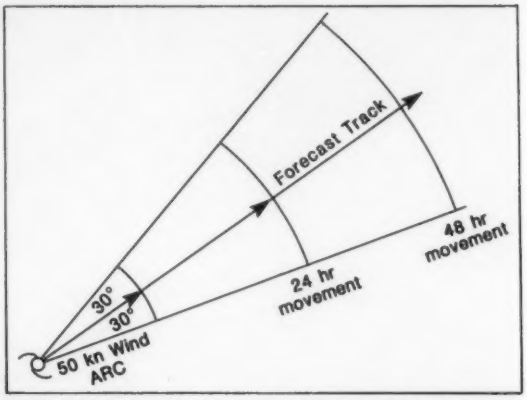


Figure 16.--Hurricane or typhoon avoidance scheme plot.

Something that is not always considered, is the sea wave and swell conditions ahead of the storm. Under certain cyclone speeds of advance high swell can extend for hundreds of miles ahead of a storm and prevent a ship from being able to set the desired course and speed to avoid the advancing hurricane or typhoon. Around tropical cyclones, early maneuvering is the safest way.

MANDATORY GROUPS vs. NEED

A couple forecasters said I went too far in pointing out that the minimum number of weather groups in a weather report was only 5, even if it says so in the NWSOH No. 1. Of course, on page 83 of the Spring 1983 MWL, second column, I pointed out that the atmospheric pressure and sea wave groups should also be included whenever possible.

Why a reduced report? When you are near shore and/or traffic is heavy, or there is some other reason that you can't get off a complete report, please send the reduced form:

(call sign) YYGGi$_w$ 99L$_a$L$_a$L$_a$ Q$_c$L$_o$L$_o$L$_o$L$_o$

i$_R$i$_x$hVV Nddff 4PPPP 222// 2P$_w$P$_w$H$_w$H$_w$.

WHAT DOES A SINGLE REPORT DO?

Of course, <u>every</u> report received by a forecaster, regardless of time or completeness is used. However, the computers that do our number-crunching and use the observations in their programs are more particular. Only the observations at the synoptic and semi-synoptic hours are used, i.e. 00, 03, 06, 09, 12, 15, 18, and 21Z (GMT or UTC) in the various computer programs.

For a computer program, the world is divided into a grid or a series of squares with a specified distance along each side. Most programs start with a climatological base. In other words, with

no ship weather reports, the computer program would print out a climatological map.

Any ship report will affect not only the corner points of the grid square that it is in, but all of the grid squares that touch it proportionally.

There is also a time effect. The ship reports for the current map would have the most effect. But, the previous reports would have a proportionately lesser effect as they became 6, 12, 18, 24, etc. hours old. As you see a single ship weather report does have definite effect on the computer products and the next forecast. Ships that routinely make all the synoptic weather reports they have the most effect on the forecasts, but even a single report does have an effect.

COASTAL WEATHER REPORTS

Another letter arrived inquiring, "Do you really want weather reports to the coast and in bays?" Yes, coastal weather reports are very important. Essentially, if your ship is underway and it is the synoptic or semi-synoptic time, send at least a reduced report. This includes the Great Lakes. Ocean vessels have reported through Boston or Portsmouth. The lakers have a radiotelephone system for reporting weather.

NEW PMO'S

For the first time in several years the Port Meteorological Officer staff is going to be up to full strength. The new PMO's are:

Richard Rasmussen - Jacksonville, FL
George Smith - Cleveland, OH
Howard Schultz - Saulte St. Marie, MI

A biographical sketch and photograph of each will be in the next issue of the MWL. An updated PMO address list is part of this issue.

WAVE, SWELL, CLOUDS AND SHIP PHOTOGRAPHS

We need photos of marine subjects. Particularly waves at various wind speeds are needed to illustrate articles, manuals, etc. Please give the name of the ship, photographer, position, time (local), and as much meteorological and oceanographic data as you can put together.

For us to be able to use the photographs you must send us a release, or if you prefer, send the photos with your name and mailing address and we will mail you a completed release form to sign. Please let us know if you want the photos or slides returned, or if we may retain the original.

Tips to the Radio Officer

RADIO PROPAGATION MAPS

The radio propagation maps, see figure 17, were omitted from the last few issues of the AMVER Bulletin. No one noticed or no one uses them. At, least, no one complained about the omission. No need for a separate letter - write your comment on the back of the "Ships Weather Observations" NOAA Form 72-1A, if you prefer.

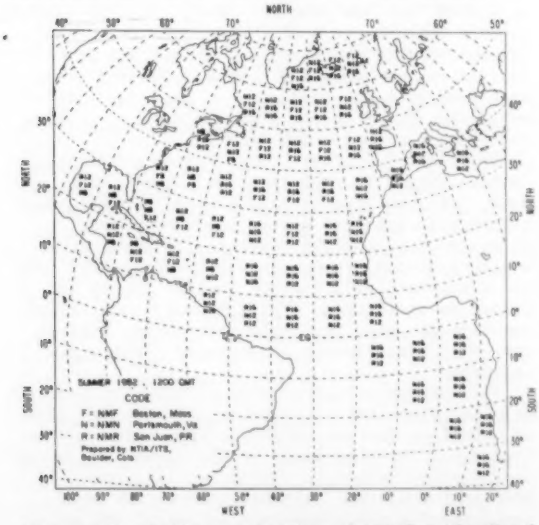


Figure 17.--Radio propagation chart for the North Atlantic for 1200 Summer 1982 from the AMVER Bulletin..

CANNED ANALYSIS

Many years ago it was common practice for ships at sea to receive weather data from land stations and other vessels. These data were then plotted and analyzed to give a current weather pattern and the basis for making short range forecasts according to the talent and inclination of the ship's crew. If plotting and analyzing data was too much effort, another alternative was available: the encoded, or "canned" analysis. The canned analysis is a weather chart encoded into a standard code format known as the IAC Fleet Code. When decoded and plotted, a complete weather chart can be produced showing pressure centers, fronts and isobars. Both the canned analysis and the plotting and analyzing of raw data are fairly labor intensive, but at one time it was the only means available to obtain a graphical presentation of marine weather features while at sea.

With the advent of radiofacsimile, ships at sea can now receive specially prepared graphics depicting a wide range of meteorological and oceanographic features rather than just the ingredients of a crude weather chart. The radiofacsimile disseminated graphics also have the considerable advantage of being prepared by a professional meteorologist with access to satellite imagery, coastal radar, computer support, and a more extensive observational data base.

The widespread use of radiofacsimile has resulted in the diminished use of canned analysis and data broadcasts. Canned anaylses are now only available in the Atlantic; data broadcasts to ships were discontinued more than 10 yr ago. This is typical of the worldwide trend.

The World Meteorological Organization is studying the feasibility of continuing canned analysis messages and has asked the National Weather Service to consult with marine user groups. If you would like to comment on the usefulness of this service please address your response to:

National Weather Service
Marine Service Branch, OM12
8060 13th Street
Silver Spring, MD 20910

Coded analysis messages are identified as Part

Three of the Atlantic High Seas broadcasts orginating from the following stations:

Time	Station	Frequency
0300,1230	NAM - Norfolk, VA	8090,12135,16180, 20225
	NAR - Key West, FL	5870,25590
	GXH - Thurso, Scotland	3724
	AOK - Rota, Spain	5917.5,7705
0030	NRK - Reykjavik, Iceland	5167

The Editor's Desk

AMVER CELEBRATES SILVER ANNIVERSARY

AMVER, an international maritime safety service of the U.S. Coast Guard, began its celebration of 25 years of significant contribution to the world's maritime community on July 18, 1983.

The Coast Guard, ship owners and the masters of approximately 16,000 participating vessels from 94 nations can be justifiably proud of their common effort to increase safety of life and property at sea. The old seafaring tradition of fellow mariners assisting each other in distress is alive and well in today's international maritime community. Transcending politics and economics, AMVER has advanced this deeply humanistic concept into the computer age.

A pioneer in the processing of maritime information, using state of the art technology, the Automated Mutual-assistance Vessel Rescue system maintains a merchant vessel plotting system that provides instant information on available vessels travelling on the oceans of the world for use in search and rescue operations. Although many nations maintain marine search and rescue forces which often work closely with one another, they could never adequately cover the vast expanse of the world's oceans without additional assistance. AMVER provides accurate information to search and rescue authorities in the U.S. or anywhere in the world. Knowledge of the positions of merchant vessels in the area of a distress anywhere on the high seas reduces the time needed to get efficient help to the scene.

Twenty-five years ago, in the Customs House in lower Manhattan, the means for compiling and maintaining search and rescue information on who is where on the high seas was put into place. The mechanics to make this simple concept work are extraordinary. The system operates using the latest in high technology computers, 105 cooperating radio stations in 25 countries, satellite and terrestial communication and the voluntary participation of the world's merchant marine.

It works like this. Approximately 16,000 merchant vessels from 94 nations have joined AMVER simply by sending in a form which includes information such as name and type of vessel, radio watch schedule, radio call sign and medical capabilities (doctor or medics on board etc.). When a participating ship is about to leave port for an offshore voyage of more than 24-hr, the master sends a sailing plan to a participating shore radio station. These radio stations perform a key function within the AMVER system by forwarding these messages to the AMVER computers in New York at no cost to the vessel. The sail plan includes information about the ship's port of departure, destination and estimated time of arrival, the intended course and speed, its call sign, the call sign of the maritime radio station the ship will be using during the voyage and information about medical personnel on board. To keep the computer plot as accurate as possible, ships are asked to report their positions periodically during their voyage and whenever they divert from their sail plan.

In spite of the diversity of communication systems used by various radio stations around the world, new computers used by AMVER can convert incoming messages to a single language the computers can understand. Once Coast Guard personnel review the information for accuracy, it is placed into the computer plot. Each day, AMVER handles approximately 6,000 messages while the computer plots the voyages of an average 2,400 vessels around the world. Thus by having access when needed to the positions of the "AMVER fleet" world search and rescue planners have an invaluable resource upon which to draw.

Seventeen U.S. Coast Guard Rescue Coordination Centers spread through the U.S., Puerto Rico, and Guam, using on-line terminals tied to AMVER, can retrieve information directly without AMVER personnel handling the request. This and other modern features, implemented between January 1980 and September 1982, further hastens search and rescue response time. Foreign search and rescue agencies can receive timely information through any Coast Guard Rescue Coordination Center via teletype.

The information, displayed on computer terminal television screens or computer printout, is known as a Surface Picture (SURPIC). Depending on the specific information need of the requesting Rescue Coordination Center, a SURPIC can list the positions and other relevant information about participating ships within a radius of 990 mi, or any area defined by latitude and longitude, around the distress area.

Armed with this information, personnel in a Rescue Coordination Center know if participating

ships are in the area and can more effectively decide which ships are appropriate to respond to a distress call. In the past, ships often made costly diversions to a distress call, not realizing that other help was much closer. AMVER information can prevent such diversions. On some occasions the AMVER plot has been the best available source of information about vessels known to be in distress or when there was uncertainty about a vessel's safety. These occasions arise when a participant sends a distress message but is unable to include its position or when the company operating the vessel or others on shore are unable to communicate with the vessel. AMVER also provides search and rescue authorities information during aviation emergencies. Transoceanic pilots, who have to ditch or abandon their aircraft at sea, can receive help from ships along their route. NASA has used this same service as a precaution for each flight of the space shuttles.

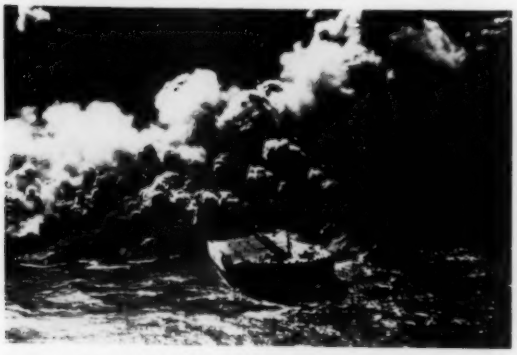


Figure 18.--The HAWAIIAN PATRIOT is shown burning and sinking 300 mi off the Hawaiian Islands during February 1977. Most of thecrew were rescued by a Phillipine freighter with the aid of AMVER. U.S. Coast Guard photo.

AMVER has been instrumental in solving inumerable cases during its quarter of a century history (fig. 18). Such is the case that took place April 23, 1983, approximately 540 mi north of the Azores and involved two AMVER participants. The Rescue Coordination Center in Falmouth, England received a call that the BAY CLUB was on fire and in danger of sinking. A surface picture, obtained through the U.S. Coast Guard's Rescue Coordination Center in New York revealed the DART ATLANTIC about 6 hr from the scene. As the DART ATLANTIC and HMS HERMES, which was also in the area, steamed to the aid of the distressed vessel, the BAY CLUB crew began abandoning ship to lifeboats. Upon arrival on scene, the DART ATLANTIC rescued 13 crewmen from one lifeboat and 14 from a second lifeboat. The valiant master of the BAY CLUB remained on board his burning ship attempting to recover a missing crewman trapped in the engine room and later presumed dead. The next day, a helicopter from the HMS HERMES lifted the master from his burning vessel and transferred him to the DART ATLANTIC which continued to South Hampton with the 28 survivors.

In a second example, shortly after midnight on December 15, 1982, AMVER was the instrument of a dramatic rescue 700 mi off the Coast of Oregon, USA. The scenario included two AMVER participants: the AMVER award winning Singapore based TIMUR GIRL and the sinking Indian freighter JALAMORARI. A surface picture, obtained by the Seattle Coast Guard Rescue Coordination Center immediately after JALAMORARI's call for help, revealed the TIMUR GIRL approximately 35-mi from the troubled vessel. As 61 crewmen abandoned ship for lifeboats, the TIMUR GIRL steamed through heavy seas and high winds to make a most dramatic rescue. One crewman, once on board the rescue vessel, collapsed and died. The remaining crewmembers were taken to British Columbia. In the words of a Seattle newsman: "60 people are alive today because AMVER worked the way it was supposed to".

The goal of AMVER officials is to plot as many of the world's merchant fleet as possible. Coast Guard Captain Neil F. Kendall, Chief of the Atlantic Area Information Division, who oversees AMVER, emphasizes that the data AMVER receives is confidential and is released only to rescue agencies. "The end result of our efforts is to rescue people," Captain Kendall says. "If ships don't report their positions to us, and we don't know where they are, the Rescue Coordination Centers can't be as effective as we would like them to be in an emergency."

Last year, AMVER plotted a total of 122,738 marine voyages and provided various rescue agencies with 2,048 surface pictures. The 60 personnel working at AMVER (fig. 19) would like to double the number of voyages plotted by doubling the number of ships participating in the program and reach 75 percent of the world's ship population. Achieving this goal would help them remain true to the AMVER motto: "No call for help shall go unanswered".

Figure 19.--A Coast Guard watch enters vessel data into the AMVER computer system. U.S. Coast Guard Photo.

Editors' note: Vessels and companies interested in joining this free marine safety system and those who would like to receive the quarterly AMVER Bulletin at no charge should write to: Commander (As); Atlantic Area; U.S. Coast Guard; Governors Island, N.Y. 10004 or call (212) 668-7885.

HIGHWAY, TRANSPORTATION FATALITY TOTALS DROP

Fatalities on United States highways and in all of U.S. transportation dropped in 1982 to the lowest levels in two decades, according to preliminary statistics released by the National Transportation Safety Board.

The highway death toll of 43,990 was a reduction of almost 11 percent from the 49,301 highway fatalities in 1981. With highway fatalities historically accounting for more than 90 perecnt of all transportation deaths, the transportation total last year -- 48,040 -- similarly was down sharply, by 10.2 percent, from 1981.

It was the second successive year of significant highway and transportation fatality reductions. The highway death toll has not been below 44,000 since 1963, when it was 41,723.

Safety Board Chairman Jim Burnett, releasing the statistics for the May 15 opening of Transportation Week, commented: We've saved more than 5,000 lives during the year, but not because we've solved our over-riding highway safety problems. The drunken driver still is involved in roughly half of all fatal accidents, and thousands of more lives could have been saved if seat and shoulder belts and child safety seats were being used by most drivers and occupants.

"The reasons for the lower fatalities in 1982 may be economic. With recovery under way, continuing this two-year downward trend will be possible only with significant progress in all of our highway safety efforts."

Of all the transportation modes, only two -- aviation and pipelines -- registered fatality increases in 1982. The airline toll soared from 4 to 235, largely in two accidents; commuter plane fatalities dropped sharply, from 36 to 13; on-demand air taxi fatalities were down from 92 to 75; general aviation was down from 1,288 to 1,164. Pipeline fatalities rose from 18 to 31.

The 16.6 percent decreases in rail-highway grade-crossing fatalities -- from 728 in 1981 to 607 in 1982 -- marked the fourth successive year of decline from a 1978 toll of 1,064. Government and industry have been cooperating to install crossing warnings and increase enforcement efforts, and "Operation Lifesaver," a state-level effort, seeks to increase public awareness of grade crossing hazards.

In the marine area the total fatalities dropped to 1,329 from 1,372 in 1981. Commercial marine was 158 (164 in 1981) and recreational marine was 1,171 (1,208 in 1981).

The preliminary 1982 transportation statistics are detailed in the pie chart (fig. 20).

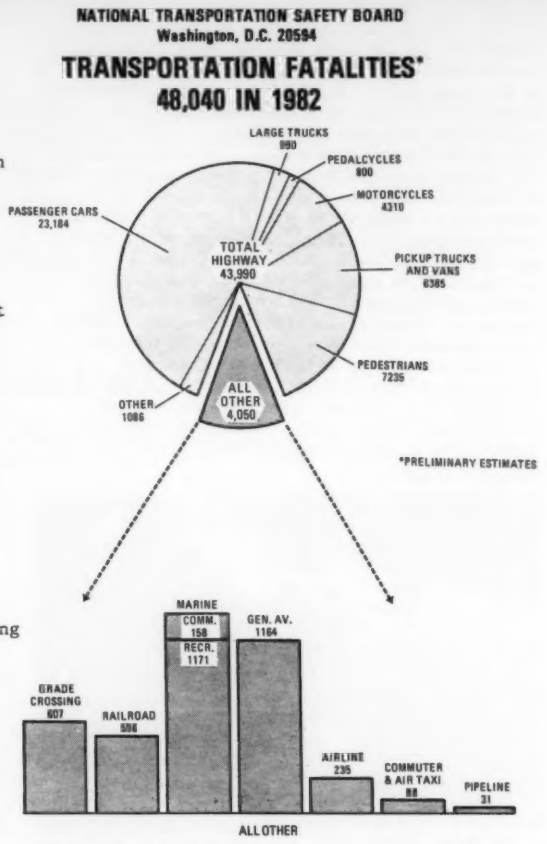


Figure 20.--Graphs of transportation fatalities for 1982.

"LOST" ARCTIC SCIENCE STATION FOUND IN TIME FOR FAREWELLS

An ice island afloat in the Arctic, "lost" for 6 mo, has been found by NOAA its onetime tenant -- perhaps just in time to bid it goodbye.

Fletcher's Ice Island, also know as T-3, was located near the North Pole during an airborne investigation of Arctic haze by scientists from NOAA's Environmental Research Laboratories in Boulder, Colo.

The island was named after Joseph O. Fletcher, a NOAA climate researcher who retired this year. The island is almost certainly in its last days, Fletcher believes. Within the next few months, he predicts, it will drift from the Arctic Ocean to the warmer waters of the North Atlantic, and will melt.

Abandoned in the mid-1970's, Fletcher's Island was first occupied, as far as is known, on March 19, 1952. Fletcher and two other men landed that day to establish a research station. Fletcher then was an Air Force lieutenant colonel with a weather reconnaissance squadron of the Alaskan Air Command.

The island, which broke off from an Ellesmere Island ice shelf, is of fresh-water ice, stronger than the salt-water pack through which it has been driven by wind and currents for many years. It is kidney-shaped, about 7 by 3 mi in size, and about a third of its original 160-ft thickness.

For a quarter century the Air Force and Navy kept scientific parties on the island year-round, providing weather reports and conducting a variety of measurements. NOAA's National Weather Service and Environmental Research Laboratories also stationed scientists there.

It was a particularly valuable observation site before the satellite era, providing vital information on Arctic oceanic and atmospheric circulations. It also made news as the scene of a personal tragedy, when a man lost his life in

an argument over a bottle of wine about a decade ago.

Pilot Dave Turner of NOAA's Research Facilities Center in Miami, flying to the North Pole in a study of annual pollution build-up over the Arctic, said the wayward island appeared distinctly on the aircraft's radar near the International Date Line about 150 mi from the pole.

"The Navy Arctic Research Laboratory had asked us to keep an eye out for the ice island on our way to the Pole," Turner said. "They had been keeping tabs on it with satellite pictures, but lost it last fall."

It was sighted and several passes were made over it at about 300 ft. It was locked into the ice pack, but the island's surface was distinctly different from that of the pack ice, and conspicuous. We could see the framework of a number of structures, lots of oil drums and equipment, and a wrecked C-47 with one wing sticking up in the air.

Over the years, Fletcher has tracked the meanderings of the island as it moved through the ice pack. Its present track is such that within several months, it will be carried by currents into the Greenland Sea and down toward the North Atlantic where it will melt, dumping its cargo -- including the ski-equipped C-47 which first carried Fletcher to the island and later to the North Pole in May 1952 -- into the ocean.

EL CHICHON DEBRIS MAY CAUSE ACID RAIN

Large concentrations of sulfur-bearing droplets believed to contain sulfuric acid from a Mexican volcanic eruption are floating in the stratosphere, and NOAA scientists think the material may be slightly increasing rainfall acidity. Researchers found the material during a NOAA-conducted investigation of the Arctic haze last month (fig. 21).

The presence of sulfur in the dust from the El Chichon volcano which erupted 13 mo ago strengthens some contentions that acid rain may stem in part from natural sources.

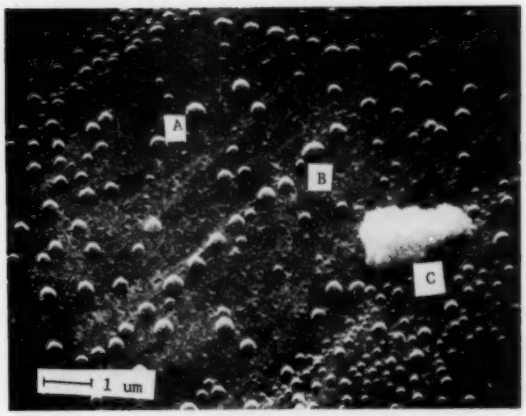


Figure 21.--An electron micrograph of an aerosol sample of EL Chichon debris. The small spheres (particles A and B) show the sulfur peak in the X-ray energy spectra. The large particle(C) contains silicon, sulfur, and iron.

Having discovered how acid rain can be caused naturally, the scientists now are faced with attempting to determine its significance. Preliminary calculations of the effect on rainfall acidity indicate a slight increase in remote areas, but probably no detectable effect in polluted urban regions.

The Arctic haze experiment, during which the El Chichon dust was collected, was investigating polluted air masses that form each winter over the Arctic, transported there by atmospheric circulation from sources in northern Asia and Europe. The data collected during the month-long investigation are expected to be useful in determining if the so-called Arctic haze and the El Chichon debris in the stratosphere are affecting the earth's climate.

MAINE FISHING CAPTAIN WINS AMERICAN SEAMANSHIP TROPHY

The 23-year-old captain of a Scarboro, Maine, fishing vessel who personally rescued five shipwrecked fishermen from a leaking life raft 90 mi off Cape Cod on a cold and stormy night last December has won the 1983 American Merchant Marine Seamanship Trophy.

The award to Capt. Thomas Bayley of the 95-ft KATHLEEN AND JULIE II was announced today by Admiral Harold E. Shear, USN (Ret.), Maritime Administrator and Chairman of the trophy selection committee, comprised of nine other leaders in the U.S. maritime community. Capt. Bayley was cited for rescuing Capt. James Dow, 32, and the crew of the 124-ft trawler ROBERT POWELL, out of Rockland, Maine, on Dec. 12, 1982.

Strong winds, rough seas, freezing rain, and poor visibility had led the two captains to lie to that morning; it was too rough to fish. They were about 30 mi apart. Shortly before noon, the ROBERT POWELL began to take on water very rapidly from a leak in her engineroom. Engineer Richard D. (Daniel) Dow, the captain's 48-year-old brother, was unable to determine the source of the leak or control the flooding with the bilge pump. He notified the captain, who radioed a MAYDAY. The crew prepared to abandon ship, using an inflatable raft.

Capt. Bayley heard the distress call and, aided by U.S. Navy and Air Force planes on the scene, headed toward the stricken vessel at full speed.

Both the weather and the situation aboard the ROBERT PERRY worsened. An emergency pump was started; it didn't help. By 1:30 p.m. the engineroom had to be abandoned. All pumps had burned out or lost power. By 2:15 the batteries went deat--there were no generators; radio contact was lost.

Engineer Dow would write later:

"At about 2:45 p.m. our vessel rolled down the (sic) port and did not come back to even keel. We immediately boarded the life raft and cut it free from the trawler. After some very hard and futile paddling, the wind and sea took us clear of our vessel. The ROBERT POWELL then rolled over to port and sank stern first."

It was 3:15. Over the next 2 hr, this was the sequence of events:

A plane circles overhead. Dan Dow fires one

of two emergency flares aboard the raft, which is taking on water from the sea and losing air.

It begins to snow hard; darkness sets in; visibility is very poor.

The two search planes, low on fuel, return to their bases.

Two men aboard the raft see a search light. They blink a flashlight.

Aboard the KATHLEEN AND JULIE II, a lookout sees the ligth for a moment; then loses it.

Dan Dow fires the last flare.

Aboard the other boat, they spot it.

The seas are estimated at 12 ft, wind force 50 kn.

Arriving alongside, Capt. Bayley makes four passes before a line can be put aboard the raft. The line is worked around to a stern ramp. They try unsuccessfully to winch the raft aboard. It is too deflated and unwieldly; water is up to the survivors' waists. Capt. Bayley reassures them: "We're not going to lose you now."

He leaves the wheelhouse and goes aft. Head first and flat on his stomach, he bellies down the ramp. With his own crewmen holding his legs, he successively locks arms with each of the five men in the raft and pulls them aboard the KATHLEEN AND JULIE II.

"Capt. Bayley pushed his boat without mercy most of the day to reach us and then pulled us aboard himself," said Capt. Dow of the POWELL. "To him we owe our lives."

Arrangements are being made to present the award to Capt. Bayley in Portland, Maine, in June. He is the 17th American Merchant Marine Seamanship Trophy winner.

Last year's award went to Capt. John Janus, of Waterbury, Conn., Master of the American President Lines' PRESIDENT MCKINLEY. He was cited for the rescue of 10 people from a small boat in the South China Sea.

HURRICANE RESEARCH FLIGHT PLANS DETAILED BY NOAA

Federal hurricane researchers plan to keep aircraft inside a hurricane for up to 36 hr continuously this season, collecting data for improved predictions of storm intensity and movement.

Two research planes from the National Oceanic and Atmospheric Administration (NOAA) Research Facilities Center in Miami will alternate flying inside a rapidly intensifying storm meeting just outside the storm as one aircraft relieves the other.

Hugh E. Willoughby of NOAA's Hurricane Research Division of the Atlantic Oceanographic and Meteorological Laboratory in Miami said scientists and instruments aboard the four-engined aircraft will study the hurricane's structure and correlate it with the storm's track across the ocean.

In addition to answering questions about the dynamics of the eye of the hurricane the research is directed at helping hurricane forecasters improve their predictions whether a storm is a threat to land, and if so, where.

Another hurricane researcher, David P. Jorgenson, said the heart of forecasting hurricane origin lies in how clouds operate in weaker tropical weather disturbances. Much of our understanding of hurricane dynamics has been derived from assumptions of how deep precipitating clouds work. Yet, the modeling hurricane genesis and accurate intensification prediction is still elusive.

A study Jorgenson will conduct with the National Center for Atmospheric Research is aimed at finding information to understand better interactions of cloud microphysics and macrophysics, momemtum transports, and the cloud-to-mesoscale interactions.

Another research plan for this hurricane season seeks to improve accuracy in forecasting surface wind speed when a storm comes ashore, as well as giving forecasters accurate off-shore surface wind observations for use in determining the extent of storm surge. Storm surge -- the tidal wave accompanying hurricanes -- accounts for most of the death and destruction from the storms.

Peter Black, head of this study, said that now the surface winds at landfall may be generally over-estimated. Earlier research, which he hopes to confirm this season, indicates that in the open ocean the maximum winds in a hurricane are at about 3,000 ft altitude, decreasing slightly below that. However, as the storm approaches shore, the lower-altitude winds decrease significantly because of friction between the land mass and the wind. Low level flights as a storm comes ashore will permit examination of this phenomenon. Frequently during landfall peak wind gusts at the surface may be close to the mean wind at the higher altitude.

SHIP EQUIPPED WITH AUXILIARY SAILS

The tanker OILMAN will become the first ship in north-west Europe to be equipped with auxiliary sails next year. The OILMAN is a coastal tanker of 1,563 tons that has been carrying petroleum products all around the English coast.

The OILMAN will be used by Walker Wingsails as an experimental vessel for the development of sails for ships.

The idea is to use a combination of main engine power and sails with the hope of reducing the consumption of fuel.

The OILMAN will have two sails, one fitted on the fore end of the tank deck and the other on the after end of the tank deck.

The ship will have them fitted in the spring of 1984 and will become the first ship in north-west Europe to use auxiliary sail power.

LETTERS TO THE EDITOR

ENCOUNTERS WITH TYPHOONS

The following letter from Captain E. W. S. Gill of the ORIENTAL AMBASSADOR to the Secretary, Nautical Institute, London, England was forwarded to me by Mr. C. J. Parker, the Secretary.

Dear Sir,

re: TYPHOON ENCOUNTERS AND AVOIDANCE

I am enclosing with this letter a copy of an extremely interesting article from NOAA Magazine, Mariners Log Issue No. 1 Volume 27, which may be of interest to Nautical Institute members as well.

The remarkable thing regarding this incident, is that even in this era of space age technology, the position of tropical cyclones cannot be guaranteed. In this particular case the typhoon was surely within strategic radar range of the U.S. Naval Base at Subic Bay, as well as any strategic radars at Manila. Yet the actual position and movement of the storm was undetected until the poor unfortunate m.v. 'MOBILE' reached the centre, and confirmed it!

It also emphasises the importance of an accurate predicted pressure inside the tropical cyclone. This can be inestimable value to a seaman in determining the position of ones ship, relative to the storm. Personally, I have always endeavoured to get below (equatorially) a tropical cyclone, rather than rely upon a steady predicted movement of the tropical cyclone as indicated by meteorological reports. It's safer!

The comments in the article regarding the inability of even large and powerful container vessels to manoeuvre as one desires once the storm has a ship in its grip can be vouched for myself. I had previously noted that container vessels with their large windage areas, can be extremely difficult to keep on courses that would normally be best for the ship under the hurricane-force weather conditions. With a quarterly wind and sea, the tendency for the ship to try to broach is enormous. The large application of helm to prevent the ship from turning has a counter effect of slowing the ship down and steerage way lost, so that it is imperative that the steering be closely watched under these conditions. With the same strength of wind and sea from ahead there is again the tendency for the ship to pay off from the wind rather violently, and any increase of speed merely increases the pounding effect. The only thing to do under these circumstances, and providing there is sufficient sea room, is to cut and run. Only never leave it too late to make this decision, for the turning of a ship in tumultuous sea, combined with extreme wind heel factors could put the ship over to an impossible angle.

Thanking you,

Yours sincerely,

E.W.S. GILL MNI

MARINE WEATHER REVIEW

The Weather Logs combined with the cyclone tracks, U.S. Ocean Buoy climatological data, gale and wave tables, and mean pressure patterns are a definitive report on the weather systems and primary storms which affected the North Atlantic and North Pacific Oceans during this 3-mo period. Hurricane Alley lists and describes tropical cyclones worldwide. Unless stated otherwise, all winds are sustained winds and not gusts; all times are G.M.T.

North Atlantic Weather Log

January, February and March 1983

WEATHER LOG, JANUARY 1983--The big news this month was the intensity of the weather systems. This was reflected in the mean sea-level pressure chart (fig. 22) in both the low- and high-pressure systems. The Icelandic Low had two centers, a 984-mb center near 69°N, 01°E and a 986-mb center over northwest Iceland. The 984-mb center was 17 mb lower than the 1001-mb normal. The Azores High was 1035 mb, 15 mb above the 1020 mb normal. Normally there is a 19 mb gradient between the centers of the Icelandic Low and the Azores High, this month the gradient was 51 mb. The primary centers were also shifted many miles to the northeast.

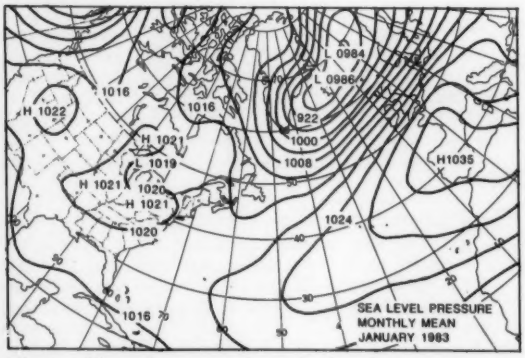


Figure 22.-- January mean sea-level pressure.

The primary storm track was from the vicinity of 38°N, 60°W to over Iceland and into the Norwegian Sea. A second primary track extended from near Cape Cod, northeastward, to join the other track about 300 mi south of Kap Farvel. Several centers traversed the Great Lakes but there was no primary track as their directions were scattered.

The anomaly analysis was a mass of concentric circles around two centers. A minus 22 mb center was near 70°N, 01°E, and a plus 17-mb center was over northeast Spain.

The 700-mb pattern reflected the surface pattern. There was a primary Low near 68°N, 45°W over the Greenland ice cap with a second center east of Scoresby Sound. These centers were shifted eastward from normally over Baffin Island. The primary High was east of Gibralter with a second center near 25°N, 53°W. The normal center is over Cuba. The height gradient was 605 m versus a normal of 485 m. The height gradient across the 50° to 60°N latitude band at 10°W supported a 40-kn average geostrophic wind for the month.

Some climatology. On January 5, 1835 the temperature dropped to -23°F at New Haven and to -40°F in the Berkshire Hills of Connecticut. On January 11, 1918 a tremendous blizzard immobilized the Midwest, stopping mail service for 2 weeks. The winds reached 60 mi/hr at Toledo, Ohio. The temperature dropped from +28°F to -15°F with the passage of the cold front. January 20, 1978 brought a northeaster with 21 in of snow at Boston, up to 20 in. in Rhode Island, and 2 ft in Pennsylvania. Winds along the Connecticut coast gusted to 70 mi/hr. On January 28, 1922 the Knickerbocker snowstorm immobilized Washington, D.C. The storm produced 28 in of snow in 32 hr. The heavy snow collapsed the roof of the Knickerbocker Theater killing 96 persons.

Extratropical Cyclones--The first week had an elongated high pressure ridge along latitude 35°N with the center over Spain. There was a series of LOWs along and north of the major northern shipping lanes. At the end of the week another 1040-mb HIGH was moving eastward approximately along latitude 40°N. The HIGH moved over Europe at mid-week of the second week, with another HIGH east of Sable Island. By the end of the week there was a 1052 mb HIGH near 45°N, 30°W. Frontal waves were forced north and westward. During the third week the HIGH moved over the Bay of Biscay with a weak pressure gradient over the central ocean. At midweek there was another small 1042-mb HIGH near 55°N, 25°W and high pressure blocked the eastern ocean. By the end of the week the HIGH was 1048 mb over France with a LOW consolidating over the north-central ocean. The fourth week began with a normal configuration with LOWs from Nova Scotia to Scotland. At the end of the week there were multiple weak pressure centers. The end of the month found a strong LOW over Scotland.

The first significant storm of the month had its orgin late on January 2 off Cape Cod. On the 4th the LOW was developing a major circulation. By 1800 CHARLIE measured 45-kn winds and 21-ft seas. The AMANDINE (48°N, 23°W) reportedly measured 78-kn winds, and the AQUADILLA (38°N, 40°W) found 55-

kn southwesterly winds with 17-ft waves.

By 1200 on the 5th the storm had raced to 62°N, 24°W and was 940 mb. Many ships had winds of storm force or greater. CHARLIE measured 47-kn winds, 20-ft seas, and 30-ft swells. The DART AMERICA measured 50-kn winds, 20-ft seas and 33-ft swells. The AMANDINE still reported measured winds of 78 kn with 7-ft seas, and 30-ft swells. LIMA had 55-kn winds and 33-ft seas with a pressure of 970-mb. She still had 48-kn and 33-ft seas on the 6th, and MIKE had 57-kn southeasterly winds but only 10-ft seas. Two ships near 48°N, 28°W had only gales but both had over 30-ft swell waves.

At 1200 on the 7th the storm was still 940 mb near 68°N, 01°E. The cyclonic circulation reached south of 50°N latitude. A platform at 61°N, 01°E reported 67 kn with 30-ft seas. Earlier there was a report near the same area of 39-ft waves. The storm moved across Nordkapp on the 8th and into the Barents Sea.

There had been a series of stable frontal waves in an inverted trough off Jacksonville, Fla. for several days. One of these became unstable and started to develop on the 5th. As high pressure moved eastward off the Maritime Provinces the LOW moved up the Gulf Stream. At 1200 on the 7th it was 964 mb about 100 mi east of Cape Race (fig. 23). Five ships reported winds plotted as 60 kn

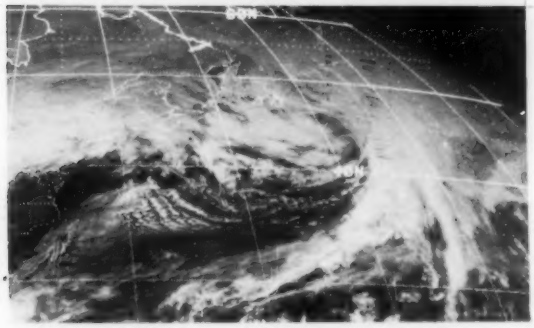


Figure 23.--The storm is near 50°N, 45°W.

or greater. SEDCO 709 and the LFMO in the vicinity of 44°N, 60°W both measured 68-kn northerly winds. The waves were not high as they were sheltered by Cape Breton Island. The TFL INDEPENDENCE at 46°N, 41°W was not so lucky with measured 60-kn southerly winds at 39-ft seas. At 1200 on the 8th the storm was 952 mb near 61°N, 29°W. Several ships measured winds near or above 60 kn. LIMA measured 68-kn southwesterly winds with 33-ft seas. The PLOUNGUE (55°N, 18°W) measured 58 kn with 39-ft seas. The higher winds were within an approximate 5° latitude circle of 57°N, 15°W.

On the 9th the storm was east of Iceland and starting to weaken but there were still reports of winds over 60 kn and waves over 30 ft. The storm broke up rapidly on the coast of Norway on the 10th.

A 1040 mb HIGH moved eastward across Nova Scotia on the 10th. A complex LOW and frontal system was pushing eastward west of the HIGH with a tight gradient between them. On the 11th the BARTLETT (41°N, 67°W) measured only 25-kn southeasterly winds but had 33-ft swells. The Meteorological Observatory at Blue Hill, Mass. measured 49-kn winds with gusts to 65 kn. The RIGG at 44°N, 59°W measured 56-kn winds from the south with 28-ft seas at 0600 on the 12th. At 1200 the ALINDA (41°N, 58°W) had 50-kn southerly winds with 25-ft seas that increased to 56 kn with 39-ft seas and 49-ft swells at 1800. She had traveled only a few miles.

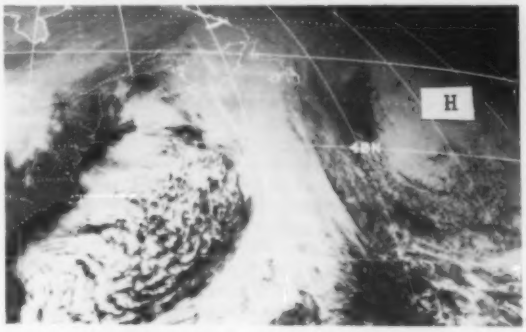


Figure 24.--The H marks the center of the HIGH. The frontal wave is near Cabot Strait.

By 1200 on the 13th the HIGH was 1052 mb near 45°N, 32°W and a new frontal wave was moving northward over Nova Scotia (fig. 24). There were winds near 50 kn in the southerly flow. The HIGH was basically stationary on the 14th and the front was weakening. There were gale-force wind reports all around the perimeter of the HIGH. On the 15th some of the higher winds and waves were on the east side of the HIGH. The SEA-LAND LEADER (38°N, 44°W) measured only 25-kn winds but the swell waves were 39 ft. The HIGH drifted into the Bay of Biscay on the 17th at 1037 mb.

The next three storms should also be considered Monsters of the Month. This frontal wave originated on the southwest side of the 1052-mb HIGH on the 14th on the original front. The storm dumped up to 2 ft of snow on new England on the 15th and 16th. As the HIGH drifted eastward the frontal wave moved over the top of the HIGH. On the 17th LIMA had winds up to 45 kn and waves up to 18 ft. As the HIGH fell apart late on the 17th the LOW expanded. At 1200 on the 18th it was 960 mb near Stockholm. There were gale-force winds along the exposed coast lines and up to 60 kn over the open water of the North Sea. The GXHN reported 60 kn winds with 49-ft swells near 57°N, 05°E. Many other reporters were having winds in the vicinity of 50 kn and waves of 20 to 30 ft. The storm continued eastward and was south of Leningrad on the 19th. High pressure was pushing over Ireland keeping the gradient tight over the North Sea producing gale and storm-force winds.

This storm caused extensive damage in Denmark, southern Sweden, and Poland. Near hurricane-force winds struck the coastal and inland areas. In Copenhagen two women were killed when a 10-ton copper roof was blown off a Parliament building. Trucks were blown off the road, trees down, and utility wires blown down. All ferry traffic between the Danish islands was halted. Two coal

cranes were blown off their tracks. The WINDRAIDER in the North Sea developed a heavy list and nearly sank. Highest winds noted were 84-kn. In southern Sweden 25,000 households were without electricity. At Stockholm the water rose 116 cm above normal, highest in 100 yr. There was flooding near Kaliningrad. There was flooding along the Polish coast and rivers. The KUDOWA ZDROJ sank in heavy seas on the 20th 8 mi north of Ibiza. Twenty crewmembers died with only 8 rescued.

The West German submarine U26 collided with the VOLKERFREUNDSCHAFT in the Baltic on the 21st. The EASY RIDER, INCA YAHUAR HUACA, LOK VINAY, and POOLZEE suffered heavy weather damage.

Another case of a frontal wave forming between two strong high pressure center. On the 20th there was a 1046-mb HIGH over the English channel and a 1040-mb HIGH near Ottawa, Canada. Waves were forming on the front separating the two contrasting air masses. By 1200 on the 21st one of the frontal waves had exploded into a 972-mb LOW near 47°N, 39°W. The DOCTOR LYKES (44°N, 32°W) had 45-kn winds and 17-ft waves while the SEA-LAND ADVENTURER (43°N, 30°W) measured 50-kn southerly winds and 26-ft waves. On the 22d the JADE FAHRT (50°N, 31°W) had 64-kn southwesterly winds and 30-ft waves. The TACOMA CITY (45°N, 42°W) had only 47-kn winds from the north but the seas were 28 ft and the swells 33 ft. The CYRENA (47°N, 40°W) measured 52-kn northwest winds with 40 ft swell waves from the west. On the 23d the ATLANTIC PRELUDE lost containers overboard. The 940-mb storm was near Angmagsslik . A low-pressure center had broken off in the southern quadrant and it raced around the eastern edge of the storm (fig. 25). The DYNA grounded at Algeciras in heavy seas and strong winds. The PRODUCT SPLENDOR appeared to have suffered her heavy weather damage in this storm.

Figure 25.--The subcenter is near 49°N, 24°W. The primary center is not visible due to the low Sun angle.

On the 25th the storm regenerated over the Denmark Strait. There were many storm-force winds. LIMA measured 50-kn winds with 28-ft swells. The BAMSA DAN (58°N, 15°W) measured 60-kn westerly winds with 39-ft seas. On the 26th the storm was over the Greenland Sea but there was still a tight gradient north of the English Channel to latitude 65°N. LIMA was still measuring winds near 45 kn and waves near 25 ft. Ships near the Shetland Islands were reporting storm-force winds. High pressure over Spain with multiple low-measure centers moving approximately along latitude 65°N retained gale- and storm-force winds over the ocean area between the pressure centers for several more days.

Late on the 29th a low-pressure center formed on the warm front of a LOW that had come out of the Gulf of Mexico. It raced northeastward with little development until the 31st. At 1200 it was 970 mb near 57°N, 14°W. The AMERICAN ALLIANCE (49°N, 23°W) had 45-kn westerly winds and 23-ft waves. The PGDW (55°N, 09°W) measured 60-kn winds and 26-ft seas at 1800. At 1200 on February 1 the 960-mb storm was over the North Sea (fig. 26) and many observers found winds greater than 50 kn. The PRINCESS SUPPLIER (60°N, 02°E) and the WALTHER HERWIG (49°N, 01°W) had 60 kn and the former 30-ft seas. The WRTZ (52°N, 04°E) also had 60-kn winds. LIMA had 25-ft swells. The storm was south of Helsinki on the 2d and the winds decreased over the North Sea.

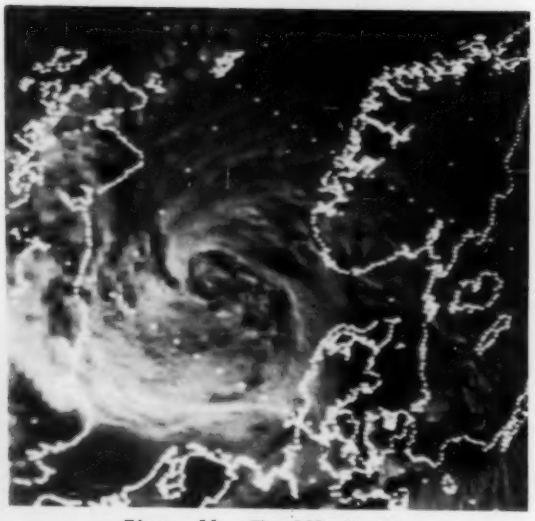


Figure 26.--The 960 mb storm.

This storm caused extensive damage to the United Kingdom, northern Europe and the Baltic region. Coastal areas and towns were flooded, trees blown down with power outages. Winds up to 100 mi/hr were reported over Germany. Many roofs were ripped off and chimneys blown over. The drilling rig STC PLATON broke tow from two tugs off the French coast. A third tug got the liner reconnected and the rig under control as the weather improved. The following ships suffered damage: CHEMTRANS ANTARES, KEMANO, hull no. 321, POLWIND, FRANCESCO NULLO, MONIMBO, GRYNGE, ASIAN FOREST, NOPAL BARBRO, KERVAN, LAPIS ONE, and STARMI. The Danish Navy training schooner ACTIV sank off the Dutch coast. Five of the eight crewmen drowned and another three were missing.

Casualties--Early on the 4th the SALM buoy in the Thistle Field was missing in winds up to 45 kn, and sea and swell up to 25 ft. It was later found 22 mi away. The following vessels had weather problems and damages about the 11th to 14th: GEORGIOS, INA, JEANNIE, JOHANNA, and KATAWA. The CITE D'ALETH sank off southeast Ireland and all ten crewmen were feared dead.

The OCEAN DRILLER broke anchor in the Gulf of Mexico on the 21st in high winds. All but 10 of the 51 crew were evacuated. The DONATA and NEFERITI contacted in heavy weather at Alexandria. Other vessels also had contact problems. They were the RASEL KHAIMA, ABULFEDA, JUBILEE VENTURE, AL MORGAN, BRUARFOSS, INTERNATIONAL FLAG, SARIP CIHAT, EMPROS, and DIA.

The HEHALUZ II broke her anchor chain and stranded near Haifa. The Notch barge EROL BEKER grounded on the 20th after the tug APRIL T. BEKER came out of the notch in heavy weather in the Gulf of Mexico. A storm in the Black Sea sank the KAPTAN HASAN HANTAL and all 11 crewmen were missing.

The TIFOSO stranded northwest of Bermuda on the 20th in adverse weather.

Other casualties are listed with the individual storms.

EATHER LOG, FEBRUARY 1983--There was a striking departure from normal this month in both the storm tracks and the mean sea-level pressure pattern. The primary storm track was from Cape Hatteras to the vicinity of 60°N, 30°W. Only two tracks reached the Norwegian Sea area. One track reached the Denmark Strait. Normally there is a primary track into the Denmark Strait and another into the Norwegian Sea.

The mean sea-level pressure pattern was very different from climatology. There was only a slight indication of the Icelandic Low, a weak 1009 mb depression on the Greenland coast northeast of Angmagssalik. The deepest Low was 1003 mb southeast of the Svalbard Islands, near the location of a 1006 mb subcenter of the Icelandic Low. The principal center affecting the primary shipping lanes was 1006 mb near 44°N, 46°W, many miles south of the climatic 1003 mb Icelandic Low (fig. 27).

The Azores High extended north to latitude 60°N off Europe. There were two centers, 1022 mb near 55°N, 17°W, off Ireland and a 1021 mb center southeast of the Azores. There were two 1020-mb anomalous Highs near Oslo and Prague.

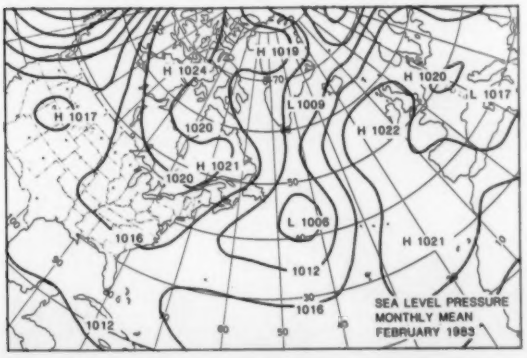


Figure 27.-- Mean sea-level pressure February.

The pressure anomaly pattern was reversed from the usual, positive in the north and negative over the central ocean. The negative center was 6 mb near 39°N, 44°W. There also was a minus 5 mb center near Mobile Alabama. There was a positive 14 mb center near 57°N, 20°W, and a 9 mb near Hopedale Labrador. The zero line in gross terms extended from New Jersey to Cape Race to 59°N, 45°W, curving to 30°N, 30°W then due south. The ocean area south of 70°N and east of 30°W was all positive.

The primary circulation center at 700 mb was near normal over Lancaster Sound. A sharp trough extended southeastward from over Newfoundland to about 30°N, 35°W. The flow was zonal from the U.S. East Coast to 50°W. There was a sharp ridge from 40°N, 20°W northward to 50°N, than northeastward to Norway. There was a positive height anomaly center near 56°N, 28°W, and negative centers near 34°N, 43°W and 30°N, 90°W.

Some climatology. On the 8th in 1835 the southeast had a severe coldwave. The temperature dipped to 0°F at Savannah, Georgia. On the 9th in 1934 a state record was set at Vanderbilt, Michigan of minus 51°F. On the 16th in 1943 Portland, Maine dipped to 39° below zero F. In 1895 on the 15th a big Gulf snowstorm produced 6 in at Brownsville, Texas and 15 in at Galveston, Texas. Snow fell at the mouth of the Mississippi River.

On the 17th in 1958 the greatest snow storm of the mid-20th century struck New England, with 30 in. in the interior and 19 in. in 24 hr at the Boston airport. On the 23d in 1802 another great snow storm raged along the New England coast. Totals reached 48 in north of Boston. Three large ships were wrecked along Cape Cod.

Extratropical Cyclones--The month started out with a deep LOW over the North Sea and high pressure over the central ocean. By midweek there was high pressure off both coasts and a strong LOW over Iceland. At the end of the week the two HIGHs had combined into one 1040 mb center north of latitude 50°N over the central ocean. The HIGH persisted the second week and finally drifted over the North Sea by the end of the week. A strong LOW developed off the U.S. coast.

The third week there was a series of strong LOWs with a strong HIGH over the Norwegian Sea. At the end of the week a 1044-mb HIGH moved southeastward off the Greenland icecap forcing the LOWs further south than usual. The HIGH drifted over Europe the fourth week with a large LOW midweek on a normal track along the major shipping lanes. At the end of the month the Azores High was building and tracking toward Spain. The LOWs were tracking normally northeastward from off the U.S. coast.

This potential storm was over Cape Sable on the first chart of the month. There were a couple of gale reports in the southwest quadrant on the 2d. The storm weakened on the 3d but deepened rapidly on the 4th over Iceland. LIMA measured 46-kn

westerly winds with 25-ft waves at 1200. The LOW was 970 mb. Several other ships measured winds over 50 kn south of the center. A station on the north coast of Iceland measured 40 kn. The storm was headed southward over the North Sea on the 5th. The HELGEY (59°N, 12°W) measured 60-kn northerly winds. A British vessel reported 26-ft swells near 56°N, 07°W. Gale to storm force northerly winds were blowing west of the center on the 6th. By 1200 on the 7th the center had plunged over the Alps into Italy but there were no strong wind reports by ships on the Mediterranean.

The ferry SAINT KILLIAN II encountered force 9 to 11 winds and heavy seas north of Lands End. Heavy seas broke a window on the bridge on the 6th and she lost power and steerage. She had 160 passengers and crew aboard plus 15 cars and 20 trucks. She later regain power and steerage. The AVRAFROST had heavy weather damage on the 5th and 6th. The WELLPARK diverted to Malta because of shifting timber and the CASAMICCIOLA EXPRESS contacted the break-water at Ravenna Roads. The PSILI contacted the quay at Split due to high winds.

This storm had a long history over land and a short one over water. It started over Texas on the 1st. It passed over the Great Lakes on the 3d but there probably weren't anv boats moving to report the weather (fig. 28). It brought rain and snow to the area. Its southeast quadrant was already off the U.S. coast. Late in the day the OPPAMA MARU off Nantucket reported 49-kn winds and 18-ft waves. There were high southeasterly gale reports on the 4th.

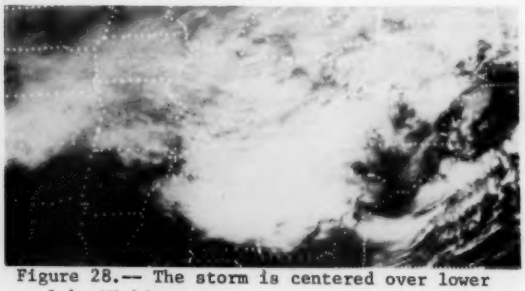


Figure 28.-- The storm is centered over lower Lake Michigan.

At 1200 on the 5th the 992-mb storm was near 43°N, 60°W. The CHERRY VALLEY (36°N, 69°W) measured 55-kn westerly winds, 15-ft seas, and 38-ft swells. On the 6th the MARINE ATLANTIC (47°N, 60°W) measured 57-kn winds from the northwest near Cabot Strait. The storm dissipated rapidly as it moved northward against a 1040-mb HIGH centered near 55°N, 25°W.

A frontal wave over Cape Hatteras on the 7th was the beginning of this storm. By 1200 it had a small but intense circulation. The buoy 41001 reported 20-ft seas. Two ships had gales up to 48 kn. On the 8th ships north and east of the storm had high winds. The RIGG near 44°N, 60°W measured 57-kn easterly winds with 25-ft seas. The LASH ITALIA (37°N, 64°W) had only 20-kn winds south of the center and west of the front but the swell waves were 33 ft. At 1200 on the 9th the storm was 986 mb north of Sable Island. The ALLTRANS EXPRESS (35°N, 66°W) measured 51-kn winds, 16-ft seas, and 25-ft swells. The EXPORT CHALLENGER (40°N, 64°W) had 45-kn winds from the west with 25-ft seas and swells. On the 10th her winds were 50 kn out of the northwest with the waves still 25 ft. On the 11th this storm also fell apart as it moved against the same stubborn HIGH as the previous storm.

Monster of the Month--This storm formed over the Gulf of Mexico on the 10th mear the mouth of the Mississippi River. At 1200 on the 11th the storm was 1000 mb off Wilmington, N.C. Buoy 41002 registered 20-ft waves. The USNS APACHE measured 45-kn southeasterly winds near 33°N, 72°W. By 1200 on the 12th the storm was 994 mb south of Nantucket Island. At 0000 the JOHN CABOT (39°N, 64°W) had reported 55-kn northeasterly winds and 20-ft seas. At 0600 the NNBN (40°N, 69°W) measured 50 kn winds from the east-northeast and 15-ft waves.

At 0820 the Coast Guard received a call from the MARINE ELECTRIC, 30 mi off Chincoteague Island, that she was taking water over the bow. An hour later they radioed they were abandoning ship. At 1730 the ship capsized and sank (fig. 29, 30 -- and front cover). She had 27,000 tons of coal aboard. Only 3 of the 36 crewmen survived the 37°F water. Two merchant vessels and Coast Guard and Navy ships assisted in rescue and search efforts for survivors. Twenty-four bodies were recovered.

Figure 29.--The MARINE ELECTRIC as she appeared in 1962. Wide World Photo.

Figure 30.--The storm as it appeared at 1700 on the 12th.

At 1200 the AMERICANA (42°N, 62°W) had 55-kn easterly winds and at 1800 SEDCO 709 (44°N, 63°W) measured 48 kn winds, and the JOHN CABOT (39°N, 69°W) had 45-kn winds from 310° with 23-ft seas. Winds gusted to 72 mi/hr at Chatham, Mass.

The storm continued up the east coast and at 1200 on the 13th was 980-mb south of Cape Race. The storm devastated the northeastern seaboard. There were reports of as much as 35 in of snow. New York City had 20 in, Baltimore - 24 in, Washington, D.C. - 26 in, and Philadelphia's 21 in was a 74 yr record. All major airports were closed, thousands were stranded in airports and on highways. At least 69 deaths were attributed to the storm. The National Weather Service called it the worst east coast storm in 40 yr.

There were many storm-force winds on the 13th with two reports of hurricane force. At 0600 the RIGG at 44°N, 60°W measured 70-kn northerly winds with 18-ft waves. At 1200 the FRED J. AGNICH (47°N, 48°W) measured 76-kn southeasterly winds. Waves up to 33-ft were recorded by the CASPIAN TRADER near 42°N, 58°W. This was still a vicious storm on the 14th at 968 mb at 53°N, 45°W. The SEDCO 706 (47°N, 48°W) measured 78-kn westerly winds at 0900 and 28-ft seas. The CORAL TEMSE (43°N, 45°W) measured 53-kn northwesterly winds with 49-ft swell waves. Other ships in the same general area had up to 33-ft waves.

Suddenly on the 15th the storm started breaking up into multiple centers and weakening. The winds died down but waves up to 25 ft were still occurring. The storm dissipated on the southeast coast of Greenland on the 16th.

The Gulf of Mexico north of the Yucatan peninsula gave birth to this storm on the 12th. It was on the South Carolina coast on the 14th. It picked up strength on the 15th over Cape Hatteras. Storm force winds were blowing in the southwest quadrant, with the AMERICAN ARGOSY and SANTA CLARA both in the vicinity of 34°N, 74°W reporting 33-ft waves. There were several winds near 60 kn on the 16th. The KOLN EXPRESS measured 62-kn northerly winds with 26-ft seas at 44°N, 53°W. The ERLANGEN (30°N, 67°W) had 36-ft swells. The KYUSHU MARU (40°N, 51°W) measured 65-kn westerly winds, 17-ft seas, and 33-ft swells. There was also a 60-kn northeasterly wind report north of the Center. By 0000 on the 17th the storm was 956-mb near 44°N, 47°W (fig. 31). The ZIM SAVANNAH (42°N, 47°W) had 50-kn winds and 26-ft waves with a 967-mb pressure very near the center. There were two reports of 70-kn northeasterly winds, one by SEDCO 706 (47°N, 48°W) at 0000, the other by the WEST VENTURE (47°N, 49°W) at 1200 with 35-ft seas. The REMUERA BAY (39°N, 40°W) measured only 29-kn winds but found 53-ft swells from the west.

The storm was nearly stationary as a stubborn 1040-mb HIGH persisted over the North Sea. The storm was weakening on the 18th but there were still a few high wind and wave reports. The storm dissipated on the 20th as it was eroded by the HIGH and an approaching LOW.

Nassau produced this storm late on the 16th. It traveled northeastward and was 990-mb near 36°N, 67°W at 1200 on the 18th. The GYPSUM KING in the

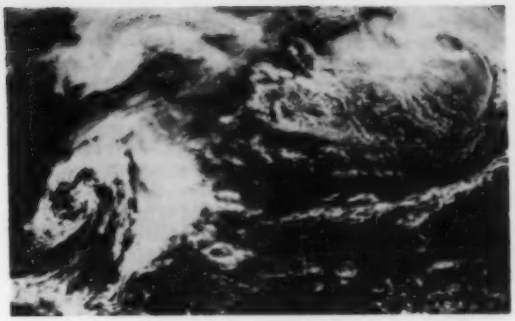


Figure 31.--This storm is in the upper right corner of this image. Another storm is brewing over the Gulf of Mexico.

northwest quadrant off Cape May had 50-kn winds at 1200. At 1800 the MINERAL HOBOKEN also measured 50-kn winds in the same area. On the 19th the FAIRSKY (39°N, 60°W) measured 60-kn northeasterly winds and 30-ft seas. The AGUADILLA (39°N, 62°W) found 50-kn winds with 30-ft seas, and 39-ft swells. The storm split into two centers on the 20th. The stronger winds were in the storm category on the 21st. The LONG LINES (40°N, 62°W) had 39-ft swells. The new LOW which formed west of the original became the primary storm on the 22d. At 1200 on the 23d this storm was 972 mb near 44°N, 40°W (fig. 32) SEDCO 706 measured 65-kn northwesterly winds with 20-ft seas. The TOLO SEA (42°N, 44°W) had 30-ft seas and 46-ft swells. Not far away the AMERICAN ARGOSY had 36-ft swells which increased to 44 ft on the 24th. The higher winds were 45- to 55-kn. At 1200 the storm was 970 mb near 50°N, 39°W. On the 25th CHARLIE had 45-kn and 30-ft seas.

The High pressure over Europe was moving southward as this tracked northward and was slowly weakening. It dissipated over the Denmark Strait.

Figure 32.-- Many storms look alike but each has subtle differences making it unique.

The eastern slopes of the Canadian Rocky mountains produced this storm on the 22d. It raced southeastward then eastward moving over the Hatteras area early on the 25th. There were some strong gales and a few storm-force winds on the 26th. The VIGOROUS measured 52-kn near 38°N, 73°W. The BAYAMON had 33-ft swells at 31°N, 72°W. At 1200 on the 27th the 977-mb LOW was at 45°N, 53°W. The TFL INDEPENDENCE (43°N, 59°W)

measured 53-kn, 13-ft seas, and 39-ft swells. On the 28th another center split off north of the original center. The winds were strong gales but the AMERICAN LEADER (42°N, 48°W) had 25-ft seas, and 39-ft swells. By 1200 on March 1 the original center had disappeared and the new center was 940 mb about 180 mi northeast of Kap Farvel where northwest 60-kn winds were blowing. The KOVDOR (50°N, 38°W) measured 58-kn westerly winds. Swell waves over 30 ft were widely dispersed through the circulation. The INGOLF (58°N, 45°W) had 30-ft seas. The storm was nearly stalled near 54°N, 37°W on the 2d. There were only gales now but CHARLIE had 26-ft waves and LIMA 18-ft waves. The storm started moving northeastward again on the 3d and the high swell waves persisted north of latitude 50°N. The storm dissipated on the 4th.

The DART ATLANTICA sustained weather damage from the 24th to 27th enroute to the United States.

Casualties--The FORTUNE ENDEAVOUR and NEWFOUNDLAND HAWK had ice damage this month in the Newfoundland area. The CHEVRON THE HAGUE had ice damage in the Baltic Sea. The CATALINA had ice damage on the Saint Lawrence River.

The NORRIS CASTLE was stranded in fog off the Isle of Wight and the NURTON and BROCKLESBY collided in fog off Dorset on the 24th.

Bad weather in the Aegean Sea area on the 5th to 8th resulted in weather damage to the following ships. The PORTOKALIS ILIOS struck the berth at Spetsai Island. The CAKRARLI stranded in the Marmara Sea. The COSTAS K. had cargo shift and was intentionally grounded off Finike, Turkey.

There were bad storms over the eastern Mediterranean from the 17th to the 20th (fig. 33). Heavy snow in the mountains of Lebanon stranded many people and isolated villages. At least 65 people perished. The ANGEL COAST grounded south of Sour. The BONNY stranded near Tartous. The GOLD FISH capsized in Sidon. In the Alexandria area there were many contact damages. The NORDLAND contacted the ALHALEME, NOVOSHAKHTINSK, and the SKOPJE. The DELME contacted the MOONLIGHT. The MARY K. contacted the AL KAHERAH and the HEINRICH HUSMANN. The PETROPOLIS struck a quay. The UNIVERSE with 340 American students aboard stranded at the entrance of Alexandria Harbor on the 25th. The CHRISSI AVGI capsized in gale-force winds and heavy seas 4 mi off Euboea Island. There were 42 people aboard and only 14 were rescued.

Figure 33.--One of the storms that caused much suffering in Lebanon.

The following ships suffered heavy weather damage at unspecified times and/or place: The AGU, ANTHONY P., ARGYLE, DAMODAR TANABE, EUROPEAN GATEWAY, DART ATLANTICA, FAME V., GRAIN TRANSPORTER, JACKSONVILLE, MARIE CLAIRE, NIKOS, NYALA, POLMAR, SAGEMAR SECONDA, SEABULK ISLANDER, SPIRIT OF TEXAS, and STEADFAST.

Other Casualties--The PANAMERICA and ORIENTAL were both anchored and aground in low water when sudden gusts of wind and high water swung them together.

WEATHER LOG, MARCH 1983--The most popular track for storms this month was from just south of the Gulf Coast eastward across Florida, then northeastward to Cape Race and on to Iceland. The width of the track spread from Cape Race to Iceland. Some storms continued eastward to Scandanavia. There was a secondary track from the central U.S. across the Great Lakes and along the St. Lawrence River. Three cyclones circled around the area between the Azores and Portugal. Two others wandered around the central ocean between latitudes 25° and 35°N and longitudes 35° to 50°W. One significant cyclone affected the Mediterranean the first of the month and three the last of the month. The major difference from climatology was a primary track from the Midwest to Goose Bay then forking up the Davis Strait and with the other fork on to Iceland did not exist.

There were major differences from climatology in the mean sea-level pressure pattern (fig. 34). The Icelandic Low was 998 mb over Keflavik, Iceland. The climatic Low is 1005 mb 200 mi southeast of Kap Farvel. There was an anomalous 1010 mb Low 200 mi southeast of Cape Cod. The

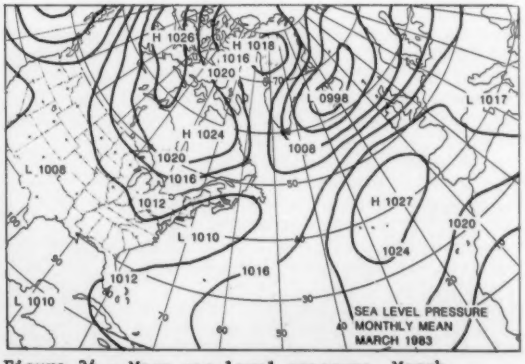


Figure 34.--Mean sea-level pressure, March.

Azores High was 1027 mb near 42°N, 20°W versus a 1020 mb climatic center near 27°N, 35°W. There was an anomalous 1024 mb High on the western shore of Hudson Bay.

There were four significant anomaly centers. The largest of plus 13 mb near 44°N, 25°W was associated with the Azores High. The anomalous High over Quebec produced a plus 7 mb center west of Hopedale, Labrador. The Icelandic Low resulted in a minus 9 mb anomaly center near 65°N, 10°W, east of Iceland. The anomalous Low off the U.S. East Coast resulted in a minus 7-mb center near Savannah, Georgia.

In the upper air at 700 mb the primary center of circulation was over Smith Sound near its climatic position, 63 m lower than normal. A sharp trough extended from Cape Chidley to Sable Island. The normal ridge over western Europe was shifted westward to longitude 20°W and accentuated by an anomalous 3,134 m High at 40°N, 23°W. The mean wind flow across the ocean was east-northeastward. There was a small minus 82 m anomaly center over the Denmark Strait and a large 124 m anomaly center near 46°N, 28°W. There was also a minus 72 m center over north Florida. A significant part of the ocean between latitudes 30° and 60°N was higher than normal.

Some climatology. On the 1st in 1914 a heavy wet snow up to 2 ft and high winds crippled New York and New Jersey. On the 5th in 1962 a tremendous storm raged along the Atlantic coast. It caused more than $200 million in property damage. Winds along the Middle Atlantic coast reached 70 mi/hr and raised 40-ft waves. Up to 33 in of snow fell in West Virginia. On the 12th in 1888 a blizzard paralyzed lower New England. Snow of 58 in fell at Saratoga, New York and 50 in at Middletown, Connecticut and was followed by record cold temperatures and 400 deaths resuted. On the 25th in 1843 another great snowstorm struck New England. On the 30th in 1823 another great northeaster with hurricane-force winds raged from New Jersey to Maine. The storm was most severe in New Jersey with high tides, trees uprooted and heavy snow.

Extratropical Cyclones--The first week started with a large LOW over the northeastern ocean. A HIGH moved southeastward from Newfoundland and another large - severe LOW was along the U.S. Coast. High pressure built over the eastern ocean and moved east with the LOW weakening. During the second week a LOW formed off Newfoundland and expanded rapidly as the HIGH over Europe weakened. The LOW dominated the central ocean most of the week. At the end of the week a new LOW was along the U.S. coast.

The third week had a typical Azores High and LOW pattern. The LOWs did not become intense and there were multiple centers. By weeks' end a LOW deepened over Iceland as a HIGH moved off North America and built. The HIGH held the LOWs inland along the U.S. East Coast. The LOWs deepened after going over the top of the HIGH. At the end of the month another LOW intensified near Iceland.

This first storm actually formed over the Gulf of Mexico the last of February but was not severe until March. The SINCLAIR TEXAS and MOUNT WASHINGTON both reported gales over the Gulf of Mexico on February 27 and 28. At 1200 on March 1 it was over Cape Hatteras. The storm was 986 mb at 38°N, 70°W at 1200 on the 2nd. The ALLTRANS ENTERPRISE (40°N, 61°W) measured 53-kn winds driving 25-ft seas, and 35-ft swells. By 1200 on the 3d the storm had expanded to 1,500 mi east-west and 2,000 mi north-south. There were many gale and storm-force wind reports and waves up to 30 ft. A British ship measured 61-kn northwesterly winds near 36°N, 73°W. The TITUS (43°N, 52°W) had 30-ft swells. There were many gale- and storm-force wind reports on the 4th. The SEDCO 709 had 56 kn winds from the south. The SEA-LAND INDEPENDENCE measured 50-kn winds with 25-ft waves. The EMELYAN POUGATCHEV found 33-ft swells southeast of the center. The AMERICAN ALLIANCE lost containers overboard in heavy weather.

The storm center passed nearly directly over the FRANKLIN (49°N, 55°W) at 0000 on the 5th. Her pressure was 984.8 mb and the storm was analyzed at 983 mb. The winds were 340° at 45 kn. The FRED J. AGNICH (48°N, 49°W) at 1200 was under the unstable coma cloud in the southwest quadrant and measured 68-kn westerly winds. On the 6th the surface storm moved away from the upper air support and quickly weakened. It managed to survive as a frontal wave type LOW through the 8th.

As the storm above moved northeastward from under the upper-air LOW this surface LOW quickly formed on the 7th in the frontal trough of the other LOW. At 1200 the WHITE CHESTNUT measured 62-kn southerly winds in the warm quadrant. The POLLENGER (41°N, 52°W) measured 52-kn northwesterly winds with 33-ft swells in the southwest quadrant. By 1200 on the 8th the central pressure had plunged to 972 mb, about 1 mb per hr, near 45°N, 45°W (fig. 35). At 0900 on the 8th the WEST VENTURE (47°N, 49°W) measured 68-kn northerly winds with 30-ft seas and at 1200 the J.E. JONSSON

Figure 35.--The storm at 1721 on the 8th.

(47°N, 49°W) measured 65-kn northerly winds but didn't report waves. Storm-force winds continued into the 9th. The WEST VENTURE, now northwest of the center still had 62-kn winds and 33-ft seas. The AMERICAN ARGOSY (41°N, 52°W) southwest of the 976-mb center measured only 45-kn winds but was pounded by 33-ft seas and 41-ft swells. The storm had been traveling southeastward but now turned northeastward. The LUDOLF OLDENDORFF and WILLIAM R. ADAMS apparently suffered heavy weather damage in this storm on the 8th and 9th.

On the 10th a second center formed north of this one and on the 11th took over the circulation. There were not as many high wind and wave reports but the ANCO CHASER (39°N, 34°W) measured 58-kn winds, 20-ft seas, and 30-ft swells. At 1200 on the 11th the new 982-mb center was near 56°N, 30°W. The AMERICAN ACCORD (44°N, 34°W) had 50-kn winds from the northwest. The storm continued weakening but on the 13th there were a couple high gale reports far south of the center. The storm moved over the Norwegian Sea on the 14th and was gone on the 15th.

A series of weak LOWs had been forming over the Carolinas since the 8th. The last one of these on the 10th was unstable and developed rapidly as the upper-air LOW plunged south and in direct alinement. At 1200 on the 11th the MARCONA CONVEYOR (28°N, 79°W) measured 55-kn westerly winds. By 1200 on the 12th the storm was 972 mb near 38°N, 68°W. Earlier a ship reported 36-ft swell waves at the cold front near 29°N, 67°W. The VAN OCEAN (32°N, 60°W) had 52-kn southerly winds near the front. The SANKO AMBASSADOR (39°N, 62°W) had 21-ft swells from the south-southeast. Winds gusted to 50 mi/hr at Falmouth, Mass. Wallops Island had 47 mi/hr. On the 13th the SAN PEDRO (34°N, 71°W) had 40-kn winds, 30-ft seas, and 41-ft swells from 290°.

The drilling rigs, SEDCO 706 and WEST VENTURE lifted their anchors and abandoned their drilling sites on the Grand Banks until the weather improved for the winter. The CHARALAMBOS developed a list in heavy weather off Cape Hatteras on the 14th while under tow. The CAST CARIBOU (46°N, 42°W) measured 50-kn northerly winds.

The storm was weakening on the 15th as a new LOW formed to the north.

This storm formed off the Texas coast, over the Gulf of Mexico, on the 16th. The Gulf Coast was already being deluged by rain from another LOW near New Orleans. By 1200 on the 17th this was a large storm south of Mobile (fig. 36). The MOUNT WASHINGTON (24°N, 87°W) measured 45-kn westerly winds and 20-ft seas. The storm crossed across north Florida early on the 18th. The AMERICAN TRADER was near Cape Hatteras with 60-kn easterly winds, 13-ft seas, and 30-ft swells. The storm brought lots of rain to the East Coast. On the 19th the storm broke into two centers, one on each side of the Appalachians. At 1800 the BAYAMON (38°N, 73°W) had 30-ft swell waves which were 41-ft at 0000 on the 20th. The 1800 observation from the HOWELL LYKES near Bermuda read 18-kn southerly winds, 5-ft seas, and 55-ft swells (code 34). The two LOWs combined into one on the 21st north of Anticosti Island. The storm weakened as it crossed the Labrador Sea but regained strength on the 23d. CHARLIE measured 23-ft swells. The storm moved over Denmark on the 24th. The BRITISH AVON (48°N, 06°W) had 40-kn gales with 33-ft swells. The storm circled over Scandanavia.

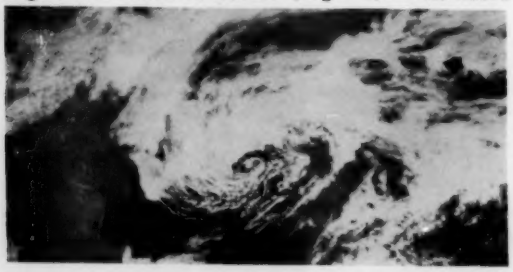


Figure 36.--This SMS image shows the storm at 1700 on the 17th.

A LOW that moved south out of the Queen Elizabeth Islands turned north again over Davis Strait. As happens many times the upper-air LOW continues eastward across Greenland and another surface LOW forms along the southeast coast of Greenland. By 1200 on the 19th it was 976 mb over Denmark Strait. A frontal wave was supplying additional warm air and moisture. A Soviet ship near 58°N, 21°W measured 60-kn westerly winds and 15-ft seas and another near 60°N, 13°W measured 50-kn southerly winds and 23-ft seas. The WALTHER HERWIG (60°N, 07°W) found 41-ft seas. The storm was 964-mb on the 20th. CHARLIE measured 41-kn westerly winds, 20-ft seas, and 23-ft swells. LIMA had 42-kn winds, 13-ft seas, and 23-ft swells. Several ships in the vicinity of 55°N, 20°W had waves over 30 ft. The storm was midway between Iceland and the Faeroe Islands on the 21st. LIMA reported winds from 50- to 55-kn and waves up to 30-ft all day. There were quite a few strong gale- and storm-force winds with high waves. The storm crossed the Skagerrak on the 22d, and continued across the Baltic Sea.

There were several LOWS the remainder of the month that produced gales and isolated storm-force wind reports but no consistent pattern except over the Mediterranean.

As one of the above described cyclones was over Sweden late on the 24th the front moved into the western Mediterranean and a wave formed over northern Italy. At 0600 on the 25th the TELLIER (42°N, 04°E) reported 52-kn northwesterly winds with 13-ft seas, and 23-ft swells. At 1200 two ships in the vicinity of 38°N, 02°E reported 44-kn winds. At 1200 on the 26th the storm was 986 mb near 44°N, 17°E (fig. 37). There were winds over 40 kn at Marseille. At 0000 on the 26th the FORT VICTORIA (38°N, 09°E) had 55-kn westerly winds with 39-ft seas. At 0600 they reported 60-kn winds with 26-ft seas, and 39-ft swells. The HONGKONG EXPRESS (37°N, 11°E) found 64-kn westerly winds with 25-ft seas. The FOSS DUNKERQUE had 60-kn winds from 320° at 1200 near 43°N, 06°E.

On the 26th the STAR ANN near 37°N, 09°E sent a Mayday that they were 1.8 mi from land and were not under command due to very bad stormy weather with wind WNW force 10, and drifting to

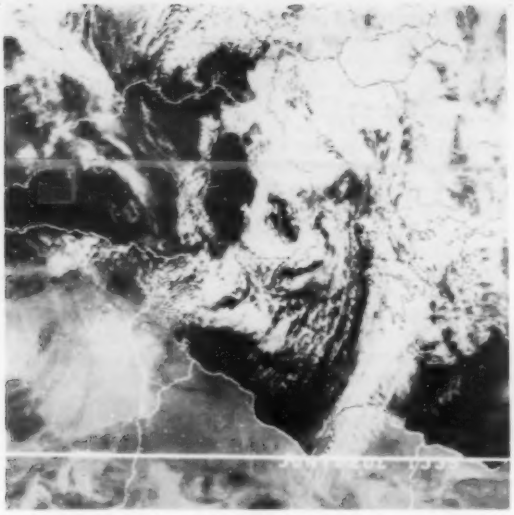


Figure 37.--The storm is centered over Italy at about 1330.

the land. The SPRING LASS near 43°N, 14°E developed a list and sank. The crew was rescued by the BIRLING. Early on the 27th the ELAZIG stranded at the Algean entrance to the Dardanelles

The storm was near SOFLYA on the 27th. Three ships in the vicinity of 37°N, 13°E had 40- to 44-kn winds and 15- to 23-ft seas. At 0600 the TOR FELICIA (39°N, 14°E) had 40-kn winds with 30-ft swells.

On the 27th another frontal wave formed in the Balearic Sea. At 0000 on the 29th it was 994 mb on the north shore of Corse. The HABIB (41°N, 07°E) sent two radio observations of 50-kn northwesterly winds with waves up to 20 ft. The MARGRIET DANIELSEN also sent two reports of 48 and 52-kn winds but no waves. The storm quickly disappeared as a LOW over Libya intensified. This brought easterly gales to a few ships on the 30th and 31st.

Casualties--Six ships had bad encounters with ice this month. Four occurred in the St. Lawrence River - Newfoundland area. They were the SINOEX (5th and 7th), FOGO ISLE (12th), LADY M. A. CROSBIE (14-19th), NEWFOUNDLAND KESTREL (15th), KRISTINA LOGOS (no date). The KOMSOMOLETS KIRGIZII and FENGTIEN collided in an ice convoyon the 17th in the Baltic Sea. The MOUTSAINA had ice damage from the 17 to 22d probably also in the Baltic Sea.

There were four ships that sufferd damage while in fog. The EL CINCO struck the CARFRA in Rijeka Roads on the 11th. The SANKO PRESTIGE collided with the AL YARMOOK at the Chesapeake Bay entrance on the 28th. The VOSTOK 2 grounded on the sunken SPYROS ARMENAKIS on the 16th in Flushing Roads. The TUMILCO struck a bridge on the 16th at Antwerp.

The following ships reported heavy weather damage at unspecified times and/or place: CAYUGA, CHEYENNE, CITY OF HARTLEPOOL, HANNAH 2002, KOUKOUNARIESK, NORDFELD, OCEANIC, PEP ANTARES, POSAVINA, SANDY LEE, and WALCHEREN.

The self-elevating drilling platform VANGUARD I suffered damage when it encountered frontal weather and 15-ft waves east of Galveston on the 1st. The PONTALVA sank on the 4th off Cape Bougaroni in force 8-10 winds. All 24 crew member disappeared.

North Pacific Weather Log

January, February and March 1983

WEATHER LOG, JANUARY 1983--There was no doubt about the primary storm track this month. The track extended from 37°N, 155°E slightly north of east to approximately 42°N, 170°W where it curved northeastward into the Gulf of Alaska terminating near Yakutat. A short second primary track extended from near 37°N, 170°E to near 40°N, 165°W. There were secondary tracks across the southern Bering Sea and from 37°N, 155°W curving into the Gulf of Alaska. A climatological primary track from about 37°N, 155°E northeastward into the western Bering Sea was missing.

There were vast differences between the monthly mean pressure pattern and the normal. The Aleutian Low was 986 mb centered near 51°N, 150°W (fig. 38). This was 13 mb deeper and many miles from the normal 999-mb near 49°N, 170°E. A trough extended southwestward than northwestward into the Sea of Okhotsk. The 1019-mb Pacific High was near the 1020-mb normal at 27°N, 128°W. High pressure over the Great Basin was 1-mb higher than normal at 1022 mb. The Asian High was 1043 mb, 5-mb higher than normal.

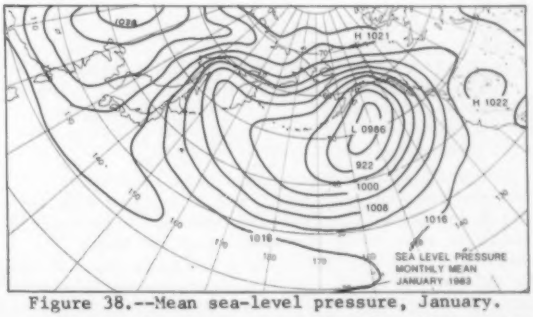


Figure 38.--Mean sea-level pressure, January.

The anomaly pattern was primarily all negative north of latitude 30°N except for a few positive values on the Asian coast. The main center was minus 21 mb near 49°N, 150°W.

The primary center of circulation at 700 mb was shifted from the Sea of Okhotsk to the Gulf of Alaska. A secondary low center was over the Sea of Okhotsk. There was an anomalous closed

high center north of Kamchatka. The circulation was mainly zonal between latitudes 25°N and 45°N except east of longitude 150°W where it curved northeastward and northward.

Some Climatology. On January 6, 1880 Seattle had their worst snowstorm ever. Four feet of snow covered the ground, hundreds of buildings were damaged andtransportation was brought to a standstill. On the 29th in 1921 a small - intense storm funneled hurricane-force winds along the mountains and destroyed 8 billion board feet of timber. At North Head, Wash. the winds reached 113 mi/hr.

Extratropical Cyclones--Severe coastal storms continued to plummel the Pacific West Coast this month. During the first week the ocean supported multiple pressure centers. There was high pressure off both the Asian and American coasts. During the second week the Pacific High built northeastwar into northern Nevada. Except for the Pacific High multiple low-pressure centers dominated the ocean north of latitude 30°N. The HIGHs weakened the third week and many LOWs claimed the ocean. As usual in multi-center situations they are generally weak. Weak high pressure continued into the fourth week with several severe-intense LOWs. A large LOW dominated the northern shipping lanes the last of the week. Another large severe LOW ended the month.

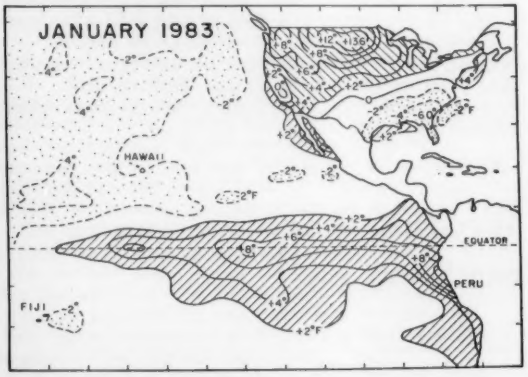


Figure 39.-- Sea-surface and air temperature anomalies at 2°F intervals. Areas of 2°F or greater are hatched and of -2°F or less are stippled. Sea-surface analysis is from NESDIS using satellite data only. From STORM DATA.

Figure 39 shows the sea-surface temperature and air temperature (for the U.S. only) anomalies for a portion of the eastern Pacific. The hatched positive area along the west coast of South America and along the Equator is sometimes referred to as the "El Nino" and the "Southern Oscillation." Many meteorologist feel there is a direct connection between this years severe El Nino and the anomalous severe weather along the California coast and other areas of the United States and especially the Pacific area including Polynesia and Australia.

This storm formed as a frontal wave south of Tokyo on the lst. It developed rapidly as cold air off Asia spilled over the warm water and warm air was feed northward ahead of the storm. At 0000 on the 4th the 982-mb LOW was near 34°N, 171°E. Three ships reported winds of 60 kn or greater south and west of the center. They were the IRISH MAPLE, CALIFORNIA RAINBOW and 8KSB. The CAMBRIDGESHIRE (29°N, 171°E) measured 41-ft swell waves. The 0000 chart of the 5th indicated a secondary center had developed in the southwest quadrant. There were many storm force wind and high wave observations. The CAMBRIDGESHIRE now reported 39-ft swells. The HARMONY VENTURE had 33-ft swells.

On the 6th the second LOW was becoming a storm in its own right at 980 mb near 39°N, 166°W. The original LOW was now 970 mb near 53°N, 147°W. The QUATSINO SOUND (50°N, 138°W) measured 32-kn southwesterly winds, 30-ft seas, and 33-ft southeasterly swells. Southwest of the new storm the EL MEXICANO found 36-ft seas and reported heavy weather damage. The THAMESFIELD found 43-ft swells. The two storms moved into the Gulf of Alaska on the 7th. There were several report of storm-force winds with waves over 20 ft. The SEA-LAND DEFENDER (48°N, 141°W) was pounded by 33-ft seas and 39-ft swells. The EXXON NORTH SLOPE found 35-ft swells in the Gulf of Alaska on the 8th as the storms deteriorated.

This was a western ocean storm that did not follow the primary storm track. It formed on the 6th over the Yellow Sea on the southeast edge of the Asian High. With the contrast between the cold-dry Siberian air and the warm water and southerly moist maritime air it developed rapidly. By 1200 on the 8th it was 976 mb near Mys Terpeniya. There were gale-force winds early in the day that increased to storm-force later. The MAMMOTH FIR (49°N, 158°E) measured 55-kn southeasterly winds with 33-ft waves at 2200. Among others the CARIBBEAN HIGHWAY (50°N, 159°E) measured 60-kn southeasterly winds and 33-ft waves on the 9th. The storm weakened on the 10th with only reports of gale-force winds but the seas remained high. The storm turned northwestward on the 11th and circled over the Sea of Okhotsk. It circled back to a southeastward track and managed to survive as a weak LOW until the 18th.

This storm formed over the Sea of Japan on the 5th. It was associated with zonal upper-air flow and raced eastward. It started to develop as a significant storm on the 8th. The STAR CHING measured 50-kn winds (45°N, 168°W) near the center on the 9th. The storm weakened for awhile but regenerated on the 11th, near 48°N, 150°W. The BROOKS RANGE, northeast of the center, measured 50-kn southerly winds and 20-ft waves. The QUATSINO SOUND found 30-ft seas and 39-ft swells on the 12th with only 30-ft seas on the 13th as the storm died south of Valdez.

There were Tehuantepecer winds over the Gulf of Tehuantepec (where else) on the 13th, 14th, and 15th. These northerly winds are generated when there is high pressure over the Gulf of Mexico. Air is forced over the Isthmus of Tehuantepec through a valley in the mountains generating high winds and waves on the south side in a venturi effect. They were reported up to 50 kn and 33 ft

by the AMBASSADOR, B. T. ALASKA, CALIFORNIA RAINBOW, TONSINA, and 9VEY.

This was a multi-centered system with no one low center becoming predominate. The original circulation started as a LOW at the point of occlusion of a front east of Honshu on the 10th. On the 11th the FRIENDSHIP (46°N, 179°W) was north of the 985-mb center with 46-kn winds, 21-ft seas, and 31-ft swells. At 0600 on the 12th the winds were 52-kn and the swell had increased to 44 ft as she paralleled the path of the storm. By 0000 on the 13th the winds had decreased to 25 kn but the swell were still 30 ft.

A new center formed to the east on the 12th with the old center turning westward. On the 13th another center formed as the second center moved into the Gulf of Alaska. The VRPP measured only 30-kn winds south of the center near 37°N, 153°W but the swell was 33 ft. The 3ELX (28°N, 138°W) reported 49-ft swells. The PHILADELPHIA measured 45-kn with 17-ft waves on the 15th.

The East China Sea spawned this storm on the 17th. It brought heavy rain to Japan on the 18th. It raced to near 36°N, 176°E under swift zonal flow by 0000 on the 20th. The AMERICAN LYNX (34°N, 178°W) reported 50-kn winds, 33-ft seas, and 46-ft swells. The CAPE CORNWALL west of the center had 23-ft waves. By the 21st the 964-mb storm was near 38°N, 157°W (fig. 40).

Figure 40.--There is an interesting double LOW system north of this storm. The chart showed some high waves northeast of the old front.

Several ships reported winds up to 50 kn and waves over 20 ft. The JALAVIHAR found 36-ft swells near 30°N, 153°W. On the 22d there were winds of 50 kn or waves to 30 ft in all quadrants. Later in the day the storm turned toward the northwest and its demise as another storm moved through its southern circulation.

This new storm had produced 50-kn winds and seas up to 26-ft on the 21st. A Canadian ship near 37°N, 178°W had 60-kn winds and 30-ft waves on the 22d. These continued into the 23d. By 0000 on the 24th the storm was 962 mb near 45°N, 139°W. The NEPTUNE DIAMOND (40°N, 139°W) measured 50-kn winds and 26-ft swells. The DILKARA measured 60-kn nearby and lost four containers overboard.

This storm was gone by the 25th, absorbed by a larger more powerful storm.

This LOW formed in a trough east of Tokyo that had moved southward over Hokkaido. As with most of the storms this month it raced eastward with the zonal upper-air flow. The 23d found observations of storm-force winds and waves up to 30 ft. The UNITED SPIRIT (40°N, 179°W) found 62-kn northerly winds at 1800. By 0000 on the 24th the storm was 948 mb near 41°N, 166°W. Storm-force or higher winds were the order of the day. Three ships reported hurricane-force winds. The SPAIN MARU (53°N, 171°E) measured 74 kn, the NEPTUNE CORAL (35°N, 164°W) measured 72 kn, and the JBWX measured 70-kn winds. The NEPTUNE CORAL reported weather damage. The observation from the OCEANUS CAMPAIGNER (36°N, 171°W) read winds of 50-kn, seas - 66 ft, and swells - 57 ft. I would be very interested in obtaining any photographs they may have taken. The cyclonic circulation from this storm covered much of the northern part of the ocean. The high winds and waves continued through the 25th. Four ships reported waves over 40-ft. The EXXON HOUSTON found 49-ft swell near 57°N, 141°W. By 0000 on the 26th the 950-mb storm was at 49°N, 150°W. The PRESIDENT FILLMORE registered 959 mb (fig. 41) as she passed north of the center. There were high winds and waves in all quadrants except the northwest. The AMERICA SUN (59°N, 144°W) measured 62-kn easterly winds (070°). The ARCO FAIRBANKS had 41-ft swells from 110°.

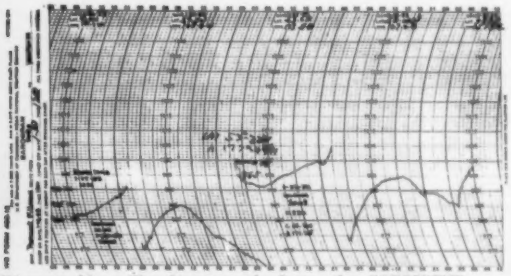


Figure 41.--The barograph from the PRESIDENT FILLMORE showing her passing through two storms. Both are good examples of barograph adjustments.

The storm started breaking down on the 27th as frontal waves moved through the southern periphery. There were still winds up to 50 kn and swell waves over 30 ft. The CHEVRON MISSISSIPPI (43°N, 145°W) had 49-ft swells from the west. The storm disappeared on the 28th.

A frontal wave that was first analyzed on the 0000 chart of the 27th was the beginning of this storm. The circulation tightened on the 28th and at 1200 the storm was 944 mb near 42°N, 166°W. The very tight gradient and circular pattern was more like a tropical than extratropical storm. The PRESIDENT FILLMORE registered 961 mb as she passed north of this storm (fig. 41). The TOYOTA MARU No. 12 was very close to the center (42°N, 165°W) with 60-kn winds from 160°. Most of the higher winds were in the 40- to 50-kn range. Waves were up to 30 ft.

On the 29th a second LOW moved in from the west, and they moved together until the 30th when one center took over. The TOYOTA MARU No. 12 measured 65-kn westerly winds, 33-ft seas and 39-ft swells. The SAGAMI MARU (34°N, 163°W) had only 26-kn winds but the swell waves were 36 ft. The FORT NELSON (40°N, 168°W) transmitted a 60-kn wind report on the 30th. The LOW was 960 mb near 47°N, 159°W. The storm was deteriorating rapidly on the 31st and disappeared on February 1.

This storm came out of the Sea of Japan and across Tokyo on the 30th. It traveled rapidly northeastward and deepened with gale-force winds on the 31st. At 0000 on February 1 the storm was 944 mb near 49°N, 173°E. The central pressure had dropped 44 mb in 24 hr. The CHIKURA MARU and PACBARONESS were about 300 mi south of the center and measured 64- and 69-kn westerly winds respectively. The waves were 33 and 41 ft. At 1200 the ALEUTIAN DEVELOPER (53°N, 173°W) had 60-kn southeasterly winds and 30-ft waves.

On the 2d gale-force winds and waves over 20 ft extended as far south as latitude 35°N. The PACBARONESS still had 41-ft swells but the winds had decreased to 42 kn. Several vessels had 50-kn winds and 30-ft waves. Buoy 46020 (56°N, 168°W) had north winds of 60 kn late in the day. The storm started decreasing in intensity and size on the 3d after crossing into the Bering Sea.

The SEVENSEAS HIGHWAY dragged anchor at Nagoya on the 30th and struck the DOCK EXPRESS.

Monster of the Month--A series of six storms struck the U.S. West Coast the last of the month from the 22d to the 29th (fig. 42). The most damaging ones were the 2d and 3d on January 22 and 23 and the 5th on the 26th and 27th. The California State Office of Emergency Services reported 3,528 homes and 539 businesses damaged or destroyed. Total damage was estimated at over $100 million. Many luxury beach homes were destroyed. The counties of Los Angeles, San Diego, Marin, and San Mateo were declared disaster areas. Heavy seas swept away a 100-ft section of the Santa Monica pier. A 150-ft section of the Crystal Pier in San Diego, and 200-ft of the Seal Beach pier were damaged (fig. 43). Hundreds of pleasure boats were damaged, destroyed or sank. Thousands of acres of farm land in the Sacramento River delta were flooded when a high tide of 9.9 ft

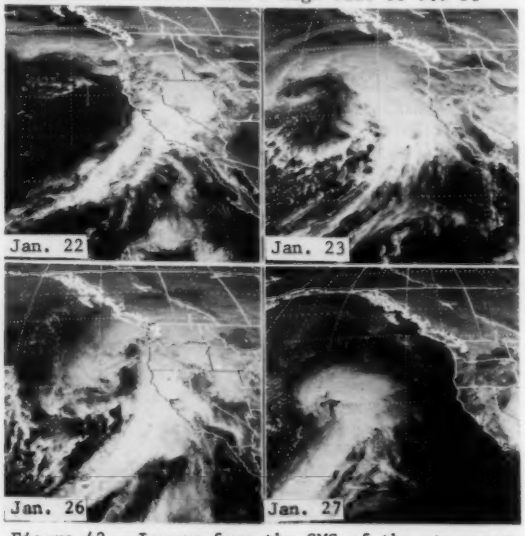


Figure 42.--Images from the SMS of the storms on four different days.

Figure 43.--A section of the pier at Seal Beach is missing after being pounded by high surf the morning of the 27th. Wide World Photo.

Figure 44.--Large ocean swells explode on submerged rocks below the Cape Disappointment lighthouse. The light in the lighthouse is 220 ft above sea level. Wide World Photo.

over flowed the dikes. Thirty foot waves roared into Humboldt Bay (fig. 44).

Winds over 70 mi/hr struck the coast line and toppled powerlines and uprooted trees. Winds gusted to 96 mi/hr at Pillar Point south of San Francisco. Flooding and mud and rock slides were a problem. Nearly 6 in of rain fell at Eureka, Calif. At least 12 deaths were attributed to the storms. The JALAJAYA dragged anchor in Los Angeles harbor and drifted on the breakwater.

Baja California suffered flooding leaving hundreds homeless, two people died.

Casualties--The KASHIMA MARU was bumped by the PACIFIC EAGLE in fog on the 29th in Wakasa Bay. The ferry AL-MALYN with 220 passengers aboard capsized in the Sulu Sea on the 11th in rough seas. More than 100 people drowned.

The following ships reported heavy weather damage: CHENNAI OOKKAM, E. B. MACNAUGHTON, KAPTAI, LABO, MESSINIAKI FISIS, RIMBA KERUING, STAR DELTA, and TORM VENTURE

WEATHER LOG, FEBRUARY 1983--There were fewer than normal significant extratropical cyclones this month. Since the mean sea-level pressure was less than normal, the storms that occurred were deeper and probably more intense than normal. The primary storm track extended eastward from Tokyo to about 40°N, 170°W, then northeastward to about 50°N, 140°W, then northward into Alaska. There was an anomalous LOW that tracked eastward across northern Baja California. Three storms formed and tracked eastward along or south of latitude 36° over the central ocean, dissipating north of Hawaii. Climatology indicates shorter tracks, and further north over the central ocean. Climotology also indicates an anticyclonic curvature over the central ocean.

The mean sea-level pressure pattern was primarily a large Aleutian Low with two 985-mb centers, 51°N, 170°W and 48°N, 152°W (fig. 45). This was 14 mb lower than normal. The Pacific High at 1019 mb was 1 mb lower than normal near 25°N, 130°W. Pressure over the western tropical latitudes was higher than normal.

The sea-level pressure anomaly pattern showed a minus 25-mb center near 46°N, 150°W. This large circular center covered most of the ocean

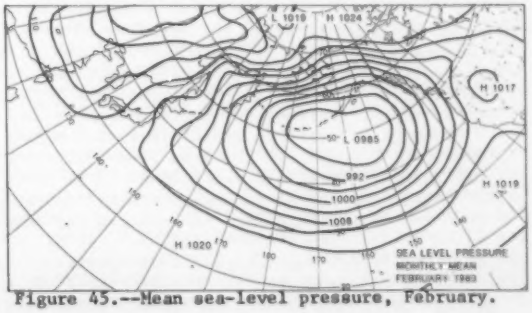


Figure 45.--Mean sea-level pressure, February.

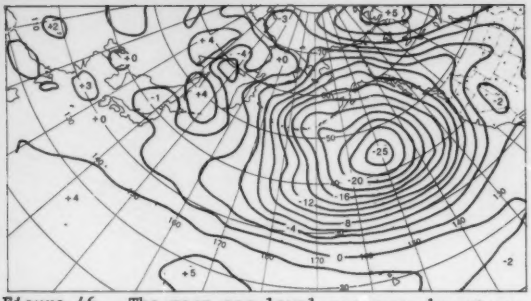


Figure 46.--The mean sea-level pressure departure from normal for February.

north of latitude 30°N in the west and east and 25°N over the central ocean (fig. 46).

In the upper air at 700 mb the center of circulation was shifted from its climatic position over Kamchatka to 52°N, 170°W, south of Umnak Island. The primary wind band was zonal Japan to near longitude 150°W where it turned northeastward into a ridge over the Coastal mountains. As at the surface there was one large minus 253-m anomaly pattern near 44°N, 151°W.

There were no tropical cyclones.

Some Climatology--On the 4th in 1887 San Francisco received 4 in of snow with as much as 7 in. in the western hill sections. In 1978 on the 10th up to 8 in of rain fell in southern California with flooding and mudslides. A wall of water ripped through the mountain resort of Hidden Springs drowning 13 people. On the 18th in 1899 the temperature in San Francisco was a record 80°F. The central U.S. was recovering from the most severe cold wave in the nation's history. In 1922 on the 25th Los Angeles set a February record of 92°F.

Extratropical Cyclones--The month started out with a large severe storm that formed in January. After its demise there was a weak quasistationary LOW over the central Aleutians. Weak LOWs and frontal waves moved across the midlatitudes. The Pacific High and low latitude Highs were normal.

The second and third weeks were noted for intense LOWs following each other in rapid succession. The high-pressure systems were weak.

The fourth week hosted more systems but they were not as well developed as the previous 2 weeks.

This first significant LOW formed in a rapidly moving trough in the southwest quadrant of a quasistationary LOW over the Aleutians. Its formation was tipped off by the pressure observation from the BRITISH SECURITY and the southeasterly wind observation from a ship about 5° latitude to the northeast. At 0000 on the 7th the storm was 968 mb near 36°N, 177°W. The ASIA HERON measured 45-kn winds and 26-ft seas southwest of the center and the FORT NELSON, SEA-LAND DEFENDER, and JAPAN CARRYALL all found 50-kn winds in the eastern quadrant. By 0000 on the 8th the 952-mb storm was near 42°N, 161°W and had expanded its circulation. The SEA-LAND DEFENDER (41°N, 160°W) measured 75-kn winds with 30-ft waves. The JAPAN CARRYALL now had 49-ft swells at 37°N, 159°W. The NEPTUNE CRYSTAL (46°N, 162°W) had easterly 59-kn winds with 23-ft seas, and 30-ft swells. The storm was weakening on the 9th. The winds had decreased to gale-force but there were still 30-ft swells. Twenty-foot swells struck the northern California coast and 16 ft struck the southern coast. The storm was gone on the 10th.

The analyst first found this LOW off Honshu on the 0000 chart of the 7th. Within 24 hr it was 984 mb near 37°N, 164°E. The OGDEN SHANNON (35°N, 163°E) had 60-kn winds with a heavy thunderstorm. At 0000 of the 9th the storm was 970 mb near 38°N, 177°W. At least three ships found winds of 60 kn or more south of the center between 30° and 34°N. They were the ALSTER EXPRESS, BIBI, and FORT NELSON. The FORT NELSON had 33-ft seas and 49-ft swells and the BRITISH SECURITY (33°N, 171°W) measured 55-kn, 17-ft seas, and 49-ft swells. The winds were not quite so high on the 10th but there were more observations of storm force or greater (fig. 47). The BRITISH SECURITY still had 49-ft swells and the JARP (30°N, 160°W) had 41-ft swells. Valdez reported 52 mi/hr winds. Storm-force winds and waves up to 30 ft continued into the 12th. The QUATSINO SOUND (47°N, 151°W) had easterly 36-ft swells. The CGC SWEETBRIER (41°N, 156°W) had winds up to 60 kn and waves up to 25 ft. The CAMPHOR with a cargo of logs had the deck cargo shift on the 11th and returned to Everett, Wash. for restowage.

Figure 47.--The front and heavy cloud cover is for east of the storm's center.

The storm was weakening on the 12th. The winds were below storm force and only a few swell reports of 30 ft. On the 13th the storm was gone.

This storm came out of China over the Yellow Sea. It traveled eastward and left snow over Japan. The PRESIDENT CLEVELAND had 40-kn gales on the 11th after passage of the cold front. At 0000 on the 12th the 972 mb storm was near 40°N, 177°W. Several ships found winds of storm-force. The BARBER TERRIER (36°N, 178°E) had 56-kn westerly winds and 33-ft seas about 300 mi southwest of the center. The QUEENS WAY BRIDGE (37°N, 178°W) measured 61-kn winds with 23-ft waves at 0300. The USCGC SWEETBRIER had 65 kn westerly winds with 30-ft waves near 33°N, 155°W on the 13th. The QUEENS WAY BRIDGE now had 36-ft seas, and 33-ft swells. The winds were lighter on the 14th, under 50 kn, but high swell wave persisted. The SWEETBRIER still had 42 ft, and the BORGNES (35°N, 143°W) had 35-ft swells. By the 15th the original

LOW died as a second center formed to the west and a frontal wave moved around the southern periphery. There were still some 30-ft waves. Both of these circulations died out on the 16th.

This storm was a series of short-lived LOWs. On the 13th there were three low-pressure centers east of Kamchatka. A new center was found on the 0000 chart of the 14th near 47°N, 168°E. Gales had developed south of the center with some 20- to 25-ft waves. On the 15th the SEA-LAND FREEDOM measured 55-kn winds from the northwest and 30-ft swells. Several other ships had winds over 45 kn. The LOS CARIBES (43°N, 170°E) had 50-knwinds at 1200. On the 16th there were many high winds and wave reports, particularly from the southwest quadrant. The MING ADVANCE (30°N, 170°W) measured 59-kn northwesterly winds driving 25-ft seas, with 44-ft swells. The ATAMAN (30°N, 172°W) measured 44-kn winds, only 10-ft seas, but 43-ft swells. The GREAT LAND and another ship found 45- to 50-kn northeasterly winds south of the Alaska Peninsula.

There were now actually five centers associated with this storm that combined into one new center late on the 18th. The original center dissipated on the 16th. It was a large storm covering most of the northern ocean.

On the 17th the highest wind was 62 kn measured by the BLUE HAWK at 31°N, 142°W on the east side of the front. The OVERSEAS OHIO measured 48-kn southeasterly winds off Dixon Entrance. The

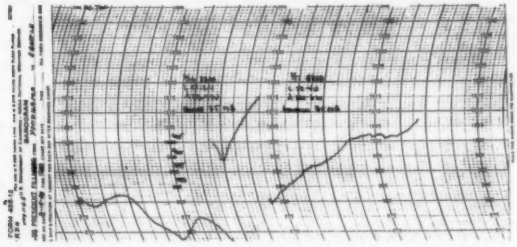


Figure 48.--Another barogram from the PRESIDENT FILLMORE AND ANOTHER STORM.

PRESIDENT FILLMORE had a barometric pressure of 959-mb near 51°N, 146°W (fig. 48). The low pressure center that would eventually become the primary center entered the southwest quadrant on the 17th and moved rapidly through the circulation. At 0000 on the 18th it was 976 mb near 39°N, 167°W. The AMERICAN LIBERTY (35°N, 175°W) in the southwest quadrant had 55-kn winds with 35-ft waves. The higher winds and waves were generally associated with this center. The DISCOVERER (60°N, 175°W) was an exception. She measured 45-kn northeasterly winds at minus 12°C near the ice edge.

At 0000 on the 19th the single 956-mb center was at 48°N, 151°W (fig. 49). The stronger winds were gale to storm-force but the MOBILE MERIDIAN reported measuring 74-kn southeasterly winds off the Scott Islands in an 1100 special observation. The SANSINENA II (53°N, 139°W) had 50 kn with 25-ft seas and 35-ft swells. The tug INVADER at 57°N, 141°W reported east-southeasterly winds of 50 to 65 kn and 25-ft waves. The storm was

Figure 49.--The 956 mb center looks like a whirlpool.

deteriorating on the 20th with some swell waves up to 25 ft.

A series of frontal waves were developing near Taiwan on the 16th. By the 17th one unstable wave continue to develop. At 0000 on the 18th it was 976-mb about 450 mi east of Tokyo. Strong winds in Tokyo Bay caused the KAKUHISA MARU to drag anchor. The CHUN KYUNG contacted the SHINSEI MARU. There were many wind reports over 50 kn and waves over 25 ft this day. More than usual were north of the center. The SEA-LAND PATRIOT measured 49-kn winds from 250° on the 19th. The storm was racing along latitude 40°N with mostly gales and had weakened. The KENJYU MARU at 48°N, 154°W measured only 13-kn winds but had 38-ft swells. On the 22d the storm was 975 mb near 47°N, 148°W. The storm turned northwestward and dissipated on the 24th.

The warm current off Honshu produced this storm late on the 20th. By the 0000 chart of the 22d there were storm-force winds and waves over 20 ft. At 0000 on the 23d the storm was 976 mb near 39°N, 176°E. The PRESIDENT JEFFERSON reported 62-kn winds east of the storm with 20-ft waves. The PACIFIC ARROW south of the center measured only 29-kn winds but had 33-ft swells. The storm was traveling through the circulation of an older cyclone. The ZIM NEW YORK (50°N, 171°E) reported 68-kn northerly winds on the 24th. This circulation was rapidly weakening but it was identifiable until going ashore on the 26th.

A series of fronts moved across California starting on the 26th (fig. 50). Earlier in the month a bad storm moved through on the 9th and 10th. During

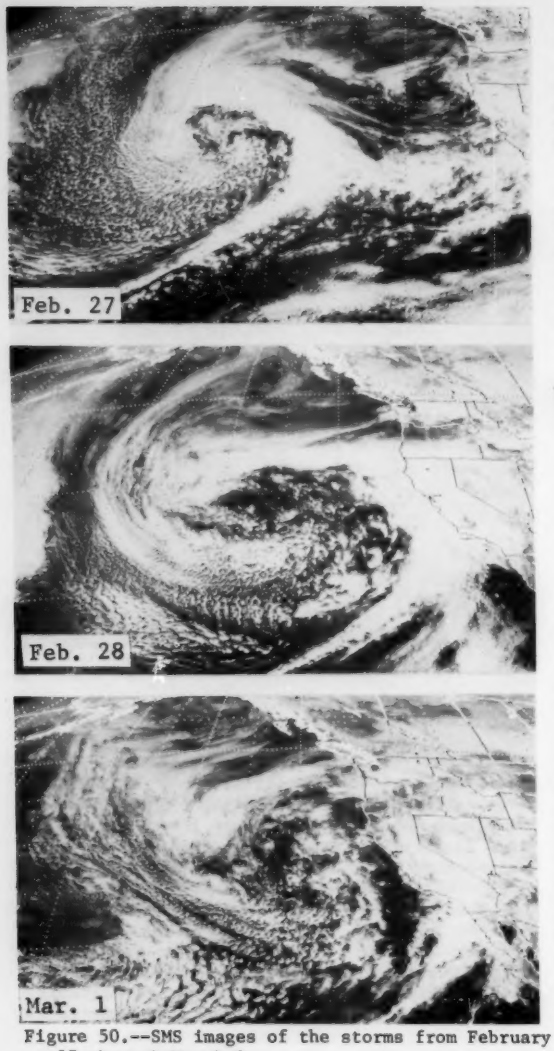


Figure 50.--SMS images of the storms from February 27 through March 1.

this series winds along the coast were over 50 kn with seas as high as 20 ft. On March 1 a freak tornado touched down in a central Los Angeles neighborhood and another in Pasadena. It collapsed homes, overturned cars, and even sucked merchandise from store windows. An oil rig on the artifical island Esther, off Seal Beach, CA, collapsed when the island was badly eroded. An earthen dam northwest of Los Angeles broke. The TRINITY NAVIGATOR dragged both anchors in Long Beach harbor on the 28th. Heavy rains caused flooding and thousands were forced from their homes with many destroyed. Beach homes damaged in the January storms were again damaged or destroyed. Nineteen people were reported killed in this series of storms. The BEN OCEAN LANCER broke her mooring lines in Los Angeles harbor. The BETTY L. grounded outside the Golden Gate Bridge. Mount Wilson near Los Angeles received 23 in of rain in 5 days.

Casualties--The ferry MAN WAI with more than 430 passengers aboard went aground in fog on the 1st off Kau I Chau island near Hong Kong. The KOEI MARU No. 5 and the RYUEI MARU No. 8 both grounded in rough weather in Japan.

The following ships suffered heavy weather damage this month: BENLEDI, CIUDAD DE SANTA MARTA, DAMODAR DR. ALBERT BLOCK, FRISKY, JADRAN FRIGO, MALLECO, and the PRESIDENT OSMENA. The LA PRIMAVERA, RIMBA KERUING and STAR DELTA all suffered heavy weather damage on voyages from the United States to Japan during late January into middle February.

WEATHER LOG, March 1983--The storm tracks were well distributed between latitudes 30° and 45°N with a nearly due east orientation from Japan to approximately longitude 170°W. East of 170°W the majority of the storms turned northeastward into the western Gulf of Alaska. Six storms approached or crossed the United States - Canadian west coast. A few storms crossed the Sea of Okhotsk out of Asia and continued into the Bering Sea. Since the paths of the storm centers were widely distributed north-south, there was no primary track, but a mean track would extend from near Tokyo to about 40°N, 180°, to 45°N, 160°W, then curve northward to near Seward, Alaska. The climatological normals for the month indicate a series of short tracks approximating the mean track.

There were significant differences in the month mean sea-level pressure chart from the normal (fig. 51). The Aleutian Low was 991 mb near 48°N, 160°W versus the normal 1005-mb center near 49°N, 170°E and a 1007-mb center near 55°N, 145°W. This large Low dominated the ocean from latitude 30°N to the Bering Strait and from the Asian to the North American coasts. The Pacific High was 1020-mb near 24°N, 130°W, about 800 mi southeast of its normal 1022 mb position. There was also an anomalous 1021-mb center near 22°N, 165°E.

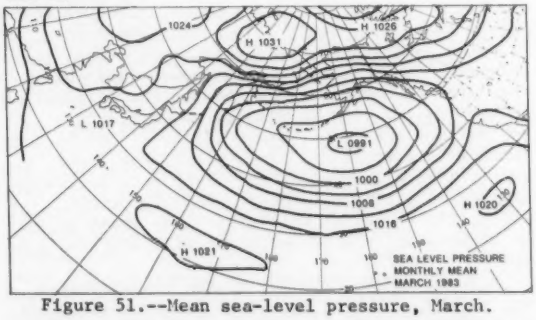


Figure 51.--Mean sea-level pressure, March.

The anomaly pattern was one large negative 22-mb oval centered near 45°N, 154°W. The zero isoline paralleled latitude 25°N west from Baja California to 170°W, to 30°N, 160°E. then curved northward into the Sea of Okhotsk (fig. 52).

In the upper air at 700 mb the center of circulation was shifted from the northern Sea of

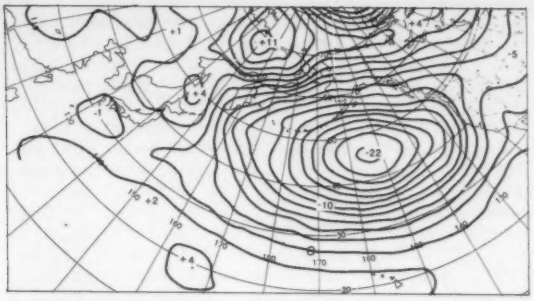


Figure 52.--Departure from normal of the mean sea-level pressure for March.

Okhotsk to 50°N, 168°W. Between latitudes 20°N and 45°N the flow was nearly zonal. The normal ridge over the Rocky Mountains was shifted slightly eastward. Most of the ocean north of latitude 25°N was below normal height.

Some Climatology. On March 12, 1967 a tremendous 4 day storm raged over California. The storm dropped 96 in of snow in 60 hr at Squaw Valley. Winds 90 mi/hr closed mountain passes and heavy rains flooded the lowlands.

Extratropical Cyclones--The first week featured many low-pressure centers north of latitude 30°N. The high-pressure centers were weak. The weather the second week was dominated by one large cyclone most of the week.

There were three severe storms during the third week. The HIGHs strengthened and were centered farther north. By the end of the week they had weakened again. The first part of the fourth week there were multiple weak pressure centers. The LOWs deepened at midweek. The Pacific High was near normal. At the end of the month there was a large LOW over the northeastern corner of the ocean.

This first storm formed in a trough associated with a quasistationary LOW over the Bering Sea on March 1. At 1200 there were several wind reports near 50 kn. The YAKUMOKAWA MARU measured 52-kn westerly winds near 36°N, 170°E. By 1200 on the 2d the 980 mb storm was near 42°N, 178°E. The JAJL near 35°N, 176°E measured 56-kn winds. The ROS CASTLE measured 44-kn northwesterly winds with 33-ft waves. The YAKUMOKAWA MARU was following the storm in the southwest quadrant and found 35-kn northwestern winds and 30-ft swells. At 0000 on the 4th the storm was 960 mb at 43°N, 160°W. The NIPPO MARU (45°N, 161°W) was near the center of the storm with a barometer reading of 968.4 mb, 50-kn north-northeasterly winds, and 23-ft waves. The NEPTUNE CORAL (45°N, 166°W) measured 45-kn northerly winds with 46-ft waves. Several ships had winds near 50 kn. The storm suddenly weakened late on the 4th and was gone on the 5th. It was probably this storm that caused heavy weather damage to the AMERICAN LANCER.

This cyclone formed near Shanghai on the 1st. As the storm crossed Honshu on the 2d another center formed east of the island. The storm was under the influenece of strong zonal winds aloft and sped eastward. There were already gale-force

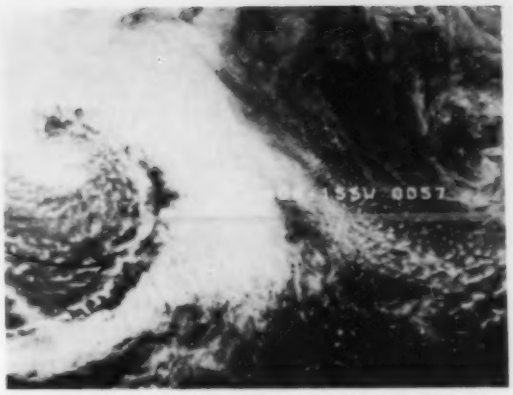


Figure 53.--The strong band of winds was located approximately along the arrow.

winds and some 20-ft seas on the 3d. By 0000 on the 4th the 978-mb storm was at 38°N, 175°E. The E.R. BRUGGE (34°N, 160°E) measured 42-kn winds from the west, 8-ft seas, and giant 39-ft swells. At 0600 the BENLEDI (32°N, 165°E) measured 52-kn winds and 36-ft seas. The storm was 964-mb at 40°N, 168°W at 0000 on the 5th (fig. 53). Three ships had winds over 60 kn. There was a very strong band of winds about 300 mi south of the center. The JAJL (36°N, 169°W) measured 69-kn westerly winds with 30-ft swells. The BOGASARI DUA (35°N, 174°W) measured 63-kn winds from 270°, 39-ft seas, and 37-ft swells from 240°. The CALIFORNIA RAINBOW (36°N, 171°W) reported 65-kn winds.

The storm slowed as it turned northeastward on the 6th. The winds and waves had decreased. The FORT HAMILTON (32°N, 159°W) reported the highest of 52 kn and 25 ft. The circulation disappeared from the chart on the 7th.

This storm followed about the same path and pattern as the previous one. It started as a frontal wave east of Tokyo on the 4th and sped eastward. It was 980 mb near 39°N, 179°W at 0000 on the 6th. The HPGH (44°N, 179°E) reported 28-kn easterly winds, 23-ft seas, and 41-ft swells from 180°. Twenty-four hours later the storm was 970 mb. There were gale- and storm-force winds. The CHEVALIER CHARLOTTE (32°N, 156°W) had 26-ft swells. By 0000 on the 8th it was 962 mb near 43°N, 153°W and had expanded to cover the northeastern quarter of the ocean. The PRABHO GOPAL (32°N, 161°W) reported 42-kn winds, 30-ft seas, and 49-ft swells. The FUSUS (35°N, 142°W) measured 44-kn winds, 17-ft seas, and 33-ft swells later in the day. The MYS TIKHY (56°N, 165°W) northwest of the center found 14-kn northeasterly winds, 3-ft seas, but 49-ft swells. The storm weakened on the 9th.

Monster of the Month--This LOW formed on the 5th in a trough north of Hokkaido and traveled south as the trough rotated around a weak cyclone. On the 6th it turned northeastward and started intensifying. At 0000 on the 8th it was 980 mb near 43°N, 157°E. There were a few gales. The PRESIDENT JACKSON had 40-kn winds and 26-ft waves about 100 mi south of the center. There were

storm force winds blowing on the 9th south and west of the center with swell waves of 20 to 30 ft. The CELCHEM CATALYST (40°N, 149°E) on the western outskirts of the storm had 34-ft seas and 49-ft swells. The EVERSPRING (35°N, 157°E) measured 51-kn northwesterly winds and 25-ft waves.

Another center had now formed east of the original center and became the primary low center on the 10th. The EUROPEAN HIGHWAY (53°N, 165°W) found 43-ft swell waves from the northeast, north of the center. At 1200 on the 10th the new center was 970 mb near 46°N, 167°W (fig. 54). The overall cyclonic circulation including several small LOWs covered a large part of the ocean. The PRESIDENT JACKSON (44°N, 175°W) was sailing east with the storm with 52 kn north winds and 33-ft seas. At 0000 on the 11th the NOAA ship DISCOVERER at 40°N, 170°W was within 7 mb of the center of the storm (975.5 mb) and measured 56-kn winds from 250° with 25-ft seas. Far to the east near Cape Flattery, the MOBIL MERIDIAN measured 66-kn southeasterly winds and 20-ft seas. There were gales and 20- to 30-ft seas as far as 1,200 mi southwest of the storm center. The fishing vessel ARCTIC DREAMER capsized and sank after being struck by an enormous wave north of Dutch Harbor. The six crewmembers were rescued.

Figure 54.--The large overall circulation can not be detected from this sectional view.

On the 12th, the RAMADAS (31°N, 160°W) had 50-kn westerly winds and 23-ft waves as she sailed past a trough line. The AMERICAN MERCHANT, 400 mi south of the center, had gales and 25-ft waves. The PRESIDENT JACKSON was still near the storm's center but the winds were only 20 kn. The crabber SEAHAWK sank 80 mi southwest of Dutch Harbor on the 12th. Five men were rescued by the BOUTWELL and a woman drowned. The storm was now shrinking in size and intensity. The higher winds and waves were north and east of the center on the 13th. The winds gusted to 60 mi/hr at Hoquiam and Bellingham, Wash.

A frontal wave was analyzed at the southern tip of Kyushu on the 10th. The 7JQX (31°N, 143°E) had 43-kn winds at 1200. By 0000 on the 11th the storm was 996 mb. The QUEENS WAY BRIDGE near 36°N, 146°E was only 100 mi north of the storm with 58-kn winds from the east-southeast, 20-ft seas, and 30-ft swells. The winds were 56 kn at 0600 and 49 kn at 1200. The waves were the same at 0600 and none were reported at 1200. The storm was traveling almost due eastward. At 0000 on the 12th the winds were northeasterly at 52 kn, and still 20-ft seas and 30-ft swells now at 070°. The STENA OCEAN (33°N, 157°E), about 120 mi south of the 990-mb center reported 64-kn westerly winds and 36-ft waves. The storm was racing eastward at about 35 kn and weakened on the 13th and early 14th when it turned northeastward and suddenly intensified as the upper-air trough deepened to a closed LOW. There were many gale- and storm-force winds on the 15th. At 0000 the storm was 964 mb near 38°N, 152°W (fig. 55). Three ships reported winds equal to or greater than 60 kn to the west, south, and southeast of the center. They were the NING ADVANCE, 41-ft seas; ROSE, no waves; and MISSION SANTA CLARA, 41-ft swells. The 16th was no better, only two ships had winds of 60 kn or greater, but there were more storm-force winds. The MING ADVANCE (36°N, 144°W) measured 50-kn westerly winds and 49-ft seas, the GREAT CRANE (37°N, 139°W) measured 64-kn westerly winds, 36-ft seas, and 41-ft swells. The storm turned toward the east on the 16th and southeast on the 17th. The winds were now mostly gales but there were still high swells. Several ships had swells over 20 ft. The GREAT CRANE (36°N, 142°W) found 41-ft swells from the northwest. The storm died off the California coast on the 19th.

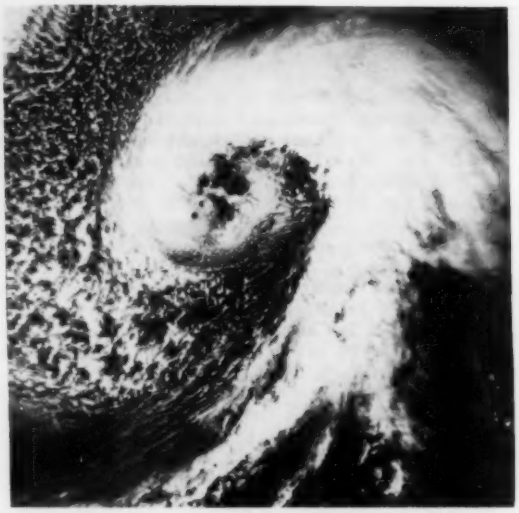
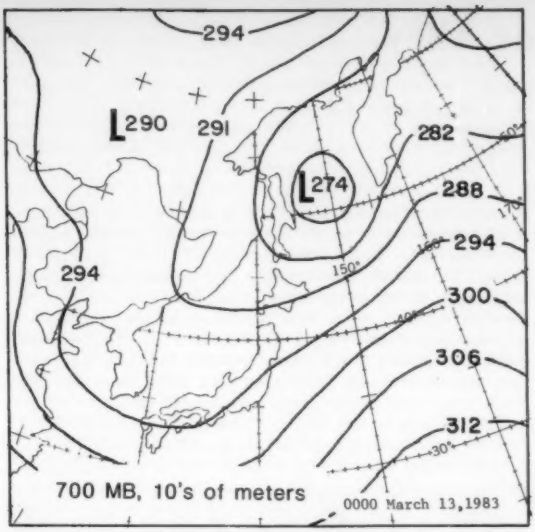
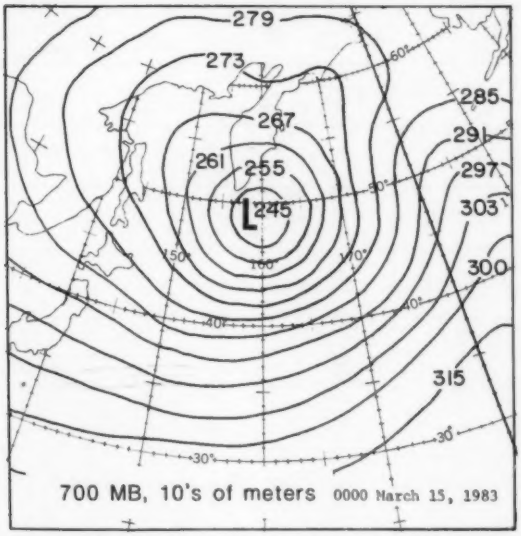


Figure 55.--A vicious storm. The two small open areas in the coma cloud looks like the eyes and head of a young seal.

The East China Sea produced this storm late on the 11th as a frontal wave. Within 24 hr it had





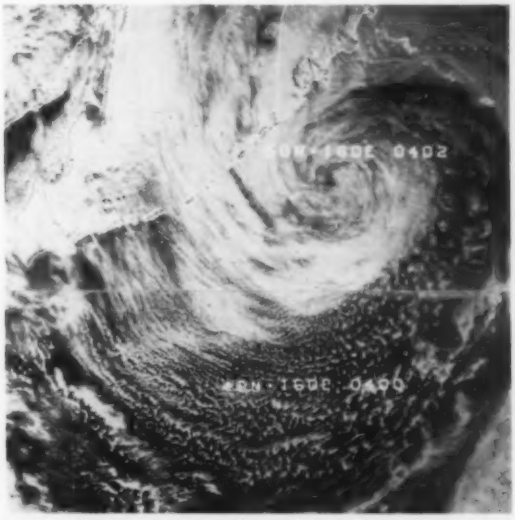


Figure 56.--The two 700 mb charts are 48 hr apart (0000/13 and 0000/15 March) and shows the dramatic drop in the central pressure height. The satellite image on the right is 4 hr later than the 700 mb chart on the left.

a large circulation. There were storm-force winds on the 13th. On the 14th there were 32 reports of winds greater than 44 kn that were received by radio or mail at the National Climatic Data Center. The highest was 70 kn by the HIRA MARU (44°N, 150°E) with 13-ft seas, and 33-ft swells.

This storm was taking a different track than the previously described storms. It traveled northeastward east of the Kurile Islands due to high pressure at the surface and a ridge in the upper air. In 48 hr the height of the 700-mb surface at the center of the LOW plunged from 2,740 m to 2,450 m, a change of 290 m (957 ft.) (fig. 56). On the 15th there were 31 reports of winds greater than 44 kn. Eleven had swell waves of 30 ft or greater. The WORLD PRIZE (45°N, 155°E) measured 67-kn winds from 290° with 44-ft seas. She was about 300 mi southwest of the 950 mb storm which was at 49°N, 161°E. An indication of the severity of this storm was the number of 1200 reports. Hurricane-force winds were reported over the Kamchatka Peninsula. Roofs were ripped from buildings, electric pylons downed, and heating installations damaged. The 16th was a repeat of the last two days only there were no reports of winds greater than 50 kn. Swell waves were still up to 33 ft. The SEA-LAND EXPLORER measured 46-kn winds and 20-ft seas. At 1800 on the 15th she passed very near the center of the storm. On the 17th the storm was filling and contracting and the number of high wind and wave reports decreased markedly.

The southern East China Sea produced this LOW. It moved along the east coast of Japan in partnership with a LOW over the Sea of Japan on the 16th and 17th. The KOSEI MARU No. 18 dragged anchor and went aground in strong winds in the Inland Sea on the 17th. The same night the JASA off Kunsan broke in two. Ten of the 22 crewmembers were safe. There were some gales on the 17th. By 0000 on the 18th the two centers had combined into one 960-mb center at 42°N, 149°E. The SEA-LAND EXPLORER (41°N, 149°E) measured 65-kn winds from 240°, with 35-ft seas, and 39-ft swells. Her barometric pressure was 963.8 mb, only 3.8 mb from the center (fig. 57). A Japanese ship, 8KSB, (44°N, 150°E) had 67-kn easterly winds and 43-ft seas and swells. The LIONS GATE BRIDGE (39°N, 153°E) measured 68-kn winds (250°), 17-ft seas, and 30-ft swells. At 0900 her winds were 55 kn with 33-ft swells. The 19th still found some storm-force winds and waves up to 36 ft. The number of high winds and seas continued

Continued on page 176

Hurricane Alley

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The tropical cyclone tracks (fig. 58) and summaries that follow are based on information provided Ted Tsui of the Naval Environmental Prediction Research Facility, the Joint Typhoon Warning Center and the Fiji Meteorological Service. The staff that contributed at Fiji include M. L. Browne, Ram Krishna, Rajendra Prasad, Sushil Sharma and Sarwan Dey. The help of all these people was vital to this report.

TROPICAL CYCLONES--JANUARY 1983

Overall January activity was slightly below the normal of 7 tropical cyclones. Of the five storms that developed this month four formed in the Australia - South Pacific region while one came to life in the South Indian Ocean (table 10). Elinah moved through the Mozambique Channel near mid month with winds that reached 65 kn. A few days earlier Jane with 80-kn winds moved ashore along the coast of Western Australia near Port Hedland. Meanwhile, across the continent Des was coming to life over the Cape York Peninsula. Once into the Coral Sea, he developed into a tropical storm but winds climbed to only 55 kn before he degenerated to tropical depression intensity. Toward the end of the month another

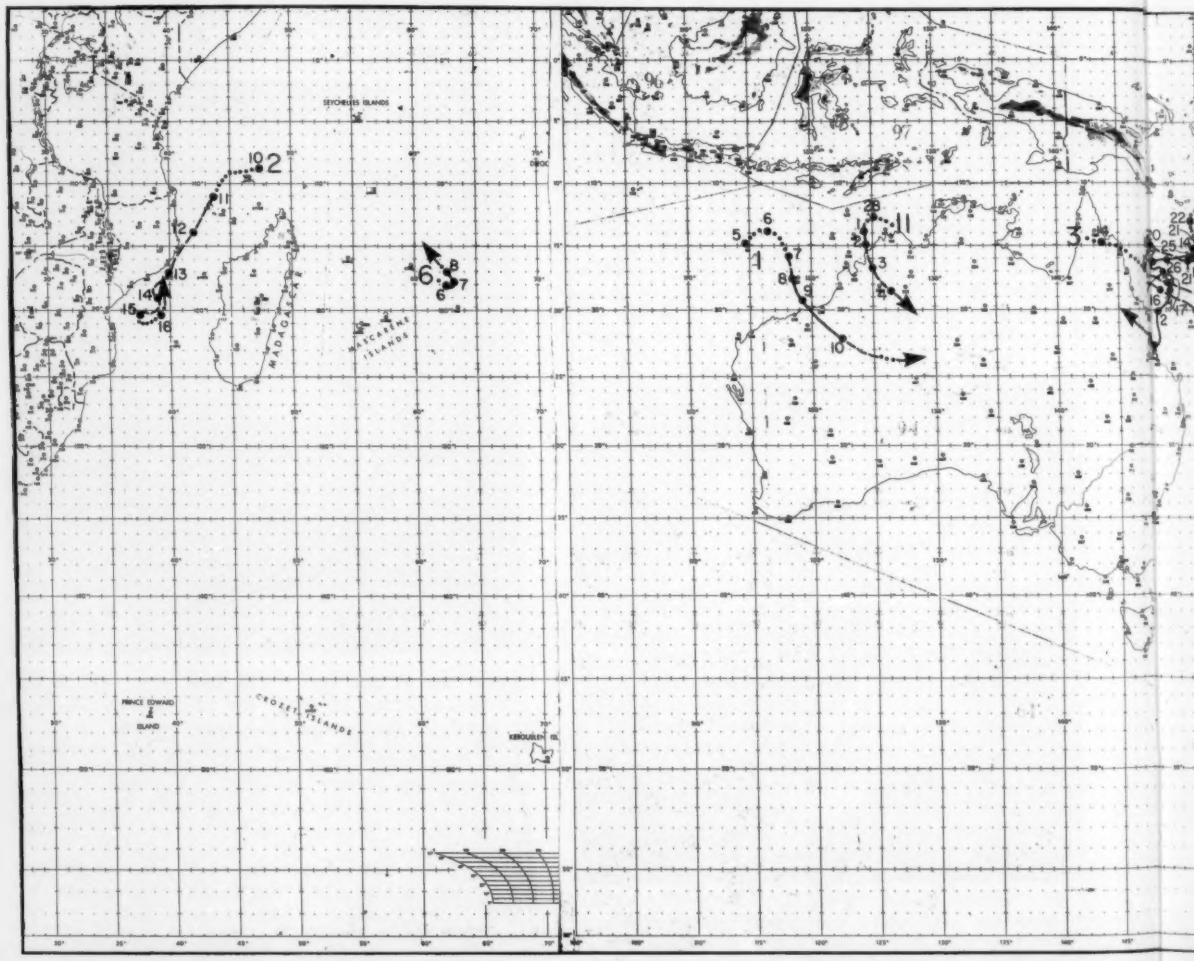


Figure 58.-- Tropical cyclone tracks for January, February, and March 1983.

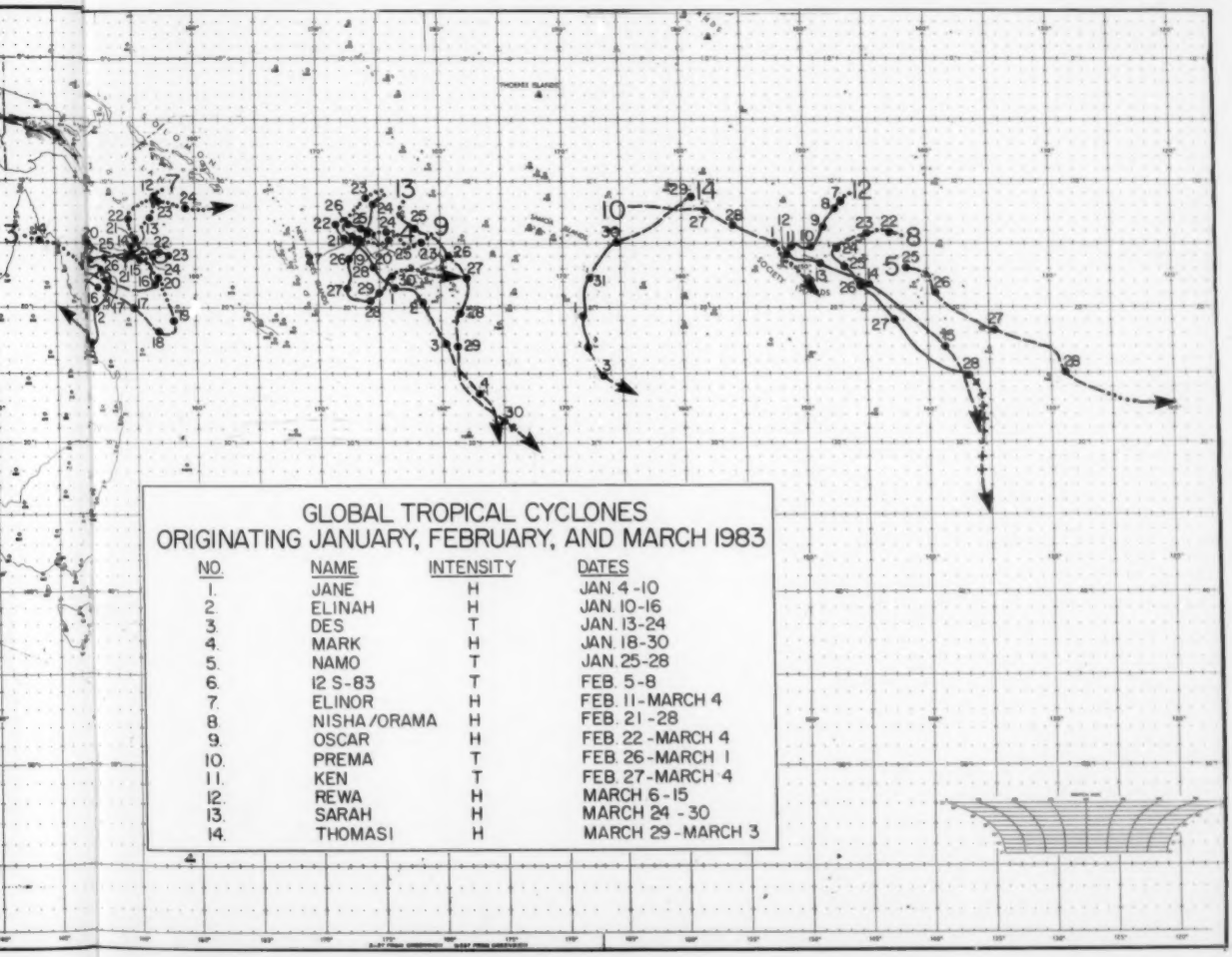
tropical storm -- Namo sprung up some 450 mi east of Tahiti. The significant feature, about this tropical cyclone, which generated a maximum of 55-kn winds, was its eastward formation and east-southeastward movement, which took it across 125°W.

Mark began as a depression, within a convergence zone, to the west of Rotuma on the 21st. By 1800 on the 23d he acquired tropical cyclone characteristics and was named. By late on the 24th Mark was generating storm-force winds and within the next 12 hr attained full hurricane intensity. Mark reached his peak early on the 26th when sustained winds were estimate at 75 kn with gales extending out about 100 mi from his center. The following day Mark began to weaken and by the 28th was downgraded to storm intensity (50 kn). By 1200 on the 29th the winds dropped below gale-force.

Rotuma reported winds of 25 kn on the 25th as did parts of Northern and Western Divisions in Fiji between the 27th and 31st. Sea water flooded low-lying coastal rice-growing areas in the Dreketi/Bua areas (north coast of Vanua Levu) on the evening of the 30th as the depression passed eastward close to Yasawa Group. The system also brought relief to most parts of Fiji which were suffering a dry summer.

TROPICAL CYCLONES--FEBRUARY 1983

This months activity was very close to normal, thanks to the continued development of South Pacific storms east of 180°. The only South Indian Ocean cyclone was a minimal, short-lived tropical storm that formed in the first week just northeast of the Mascarene Islands. Similar to last month, two storms formed on either side of Australia. Elinor came to life just south of the Solomon Islands and meandered through the Coral Sea for nearly 3 weeks before coming ashore in Queensland, near Rockhampton. She was a potent storm as maximum winds were estimated at 100 kn. In Western Australia tropical storm Ken, sporting



GLOBAL TROPICAL CYCLONES
ORIGINATING JANUARY, FEBRUARY, AND MARCH 1983

NO.	NAME	INTENSITY	DATES
1.	JANE	H	JAN. 4 - 10
2.	ELINAH	H	JAN. 10-16
3.	DES	T	JAN. 13-24
4.	MARK	H	JAN. 18-30
5.	NAMO	T	JAN. 25-28
6.	12 S-83	T	FEB. 5-8
7.	ELINOR	H	FEB. 11-MARCH 4
8.	NISHA/ORAMA	H	FEB. 21-28
9.	OSCAR	H	FEB. 22-MARCH 4
10.	PREMA	T	FEB. 26-MARCH 1
11.	KEN	T	FEB. 27-MARCH 4
12.	REWA	H	MARCH 6-15
13.	SARAH	H	MARCH 24 - 30
14.	THOMAS	H	MARCH 29-MARCH 3

Table 10.--Global tropical cyclone summary January, February and March 1983.

No.	Name	Est. max. wind (kn)	Basin	Dates
		January 1983		
1	Jane	80	Aust.-S. Pacific	4-10
2	Elinah	65	S. Indian	10-16
3	Des	55	Aust.-S. Pacific	13-24
4	Mark	80	Aust.-S. Pacific	18-30
5	Namo	55	Aust.-S. Pacific	25-28
		February 1983		
1	12S-83	35	S. Indian	5-8
2	Elinor	100	Aust.-S. Pacific	11-Mar. 4
3	Nisha/Orama	95	Aust.-S. Pacific	21-28
4	Oscar	100	Aust.-S. Pacific	22-Mar. 4
5	Prema	40	Aust.-S. Pacific	26-Mar. 1
6	Ken	55	Aust.-S. Pacific	27-Mar. 4
		March 1983		
1	Rewa	100	Aust.-S. Pacific	6-15
2	Sarah	80	Aust.-S. Pacific	24-30
3	Tomasi	90	Aust.-S. Pacific	29-Apr. 3

55-kn maximum winds, had just a brief life at sea before crashing the coast near Collier Bay. Both storms moved ashore during the first few days of March.

Tropical cyclone Nisha (called Orama by the Tahiti Meteorological Service) was the third cyclone to strike French Polynesia. Nisha developed from a depression that had formed north of the Marquesas on the 13th. By late on the 22d it had acquired tropical cyclone characteristics and winds had reached 40 kn. Within 2 hr it was named Nisha by the Tropical Cyclone Warning Center at Nandi, Fiji, which has been assigned the operational responsibility for warnings, between the Equator and 25°S from 160°E to 140°W, by the New Zealand Meteorological Service. The Tahiti Meteorological Service had already named the storm Orama and to prevent confusion to the local Tahiti public this name was retained. At about 0000 on the 24th sustained winds reached a peak estimated at 95 kn close to Nisha's center. The radius of gale-force winds was estimated to be about 80 to 100 mi; this radius increased to near 200 mi in the southern semicircle as the storm moved into higher latitudes where the pressure gradient increased.

The worst hit area was the Tuamotus which had about 30 of its atolls in the north and west severely damaged or destroyed. On Rangirora alone two villages of Avatoru and Tiputa were estimated to have suffered $1.7 million in damages. The most badly hit atoll was perhaps Anaa which was described as "practically wiped off the map". Estimates of waves in the area were as high as 26 to 29 ft.

Oscar developed from a depression that began just south of Rotuma on the 23d. Early on the 25th storm was generating gale-force winds and was christened. By midnight on the 26th Oscar's winds reached hurricane strength and soon after he began heading for Fiji. Through the 28th Oscar continued to intensify. His position was determined each hour by Nandi radar until late on March 1 when strong winds forced abandonment of the radar operation. It was estimated that maximum winds near Oscar's center had reached 100 kn with

Table 11. Hurricane Oscar Data

	Date/time+	Sustained wind (kn)	Peak gust (kn)	Total storm rainfall (in.)
Yasawa-i-rara	1/0900	30	46	0.8
Viwa	1/1500	50	63	5.7
Nandi Airport	1/2000	68	100	
Vunisea, Kandaru	2/0600	80	116	15.9
Nadi Airport	1/2100	63	100	15.9
Lautoka				8.9
Government House				7.3

+time - l.s.t.

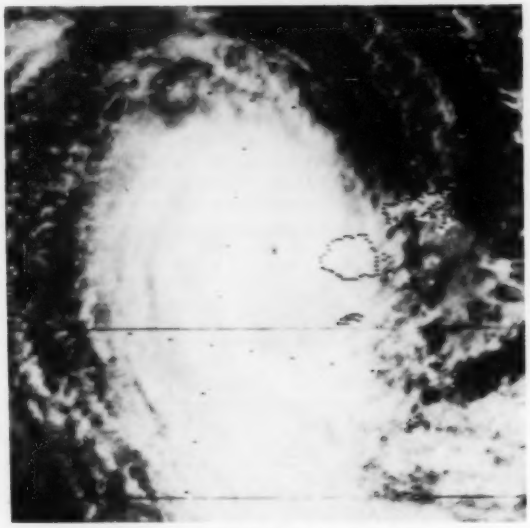


Figure 59.--Hurricane Oscar on March 1.

gusts up to 140 kn (fig.59). At Nandi Airport winds increased steadily on the 1st reaching 50 kn by about 5 pm (l.s.t.). From 8 pm to 11 pm sustained winds ranged between 62 and 68 kn; peak gusts of 100 kn occurred at 8:40 pm. Early on the 2d Vunisea on Kandaru reported 80-kn winds with 116-kn gusts (table 11).

Damage was mostly in the form of severe flooding from storm tides and torrential rains. Oscar was responsible for 9 deaths. Hardest hit areas included the Mamanutha Group, western and southwestern Viti Levu, and Yanutha, Vatulele, Kandevu and Mbengga Islands. In some areas storm surges reached 9 to 12 ft. Flooding due to torrential rains was particularly severe in western and southwestern Viti Levu. At Nadi Market flood levels were about 12 ft above the asphalt pavement. In the Singatoka Valley, which supplies most of Fiji's vegetables, most crops were destroyed as flooding reached levels beyond living memory of most people.

Prema came to life briefly at the end of the month while hurricanes Oscar, Elinor and Nisha were all roaming the South Pacific. On the 26th a depression developed in a low pressure trough south of Manihiki and during the day it was upgraded to tropical cyclone Prema with maximum sustained winds estimated at 40 kn. Prema moved slowly east-southeastward during her brief life. The Meteorological Office at Rarotonga has reported that the northern Cook Islands comprising Penrhyn,

Manihiki, Rakahanga and Pukapuka had winds of about 30 kn with high seas damaging wharves and cargo sheds.

TROPICAL CYCLONES--MARCH 1983

Activity was below normal because of the lack of South Indian Ocean cyclones. In the South Pacific, Rewa and Tomasi formed east of 180 while Sarah developed north of the Fiji Islands.

Sarah was the second tropical cyclone with hurricane force winds to strike Fiji within the same month (following Oscar) -- a unique occurrence during the past 50 yr. Sarah affected the eastern sections of Venua Levu, Taveuni and the nearby islands as well as the Lau group. The lowest recorded pressure was 951.5 mb at Ono-i-Lau at 1400 (l.s.t.) on the 28th. Tropical cyclone Sarah was still developing when it reached Fiji and did not reach hurricane strength until about noon on the 27th, when it was centered about 60 mi northeast of Lakemba. The following day maximum winds were estimated at 80 kn with gusts to 120 kn. Sarah passed close to Ono-i-Lau, which reported 70-kn sustained winds for about 2 hr with gusts reaching 115 kn.

Although when it passed southern Lau, hurricane Sarah had the same order of intensity as Oscar, its effect was less devastating because its track lay near much smaller islands and the damaging winds were of much shorter duration. Also Sarah did not appear to be accompanied by the same high storm surge that caused so much coastal damage during the passage of Oscar. Rainfall amounts ranged up to near 15 in at Ono-i-Lau and 1 to 11 in elsewhere.

Rewa became the fourth tropical cyclone to affect French Polynesia in the 1982-83 season. He formed some 350 mi west-southwest of the Marquesas Islands and the same distance east-northeast of the Society Islands on the 7th. At the time sea-surface temperatures in the area were about 84°F with anticyclonic outflow at upper levels. These features aided in the rapid development of Rewa.

Moving slowly toward the southwest Rewa reached hurricane intensity by 0000 on the 9th (fig. 60). The storm's position from the 10th through the 12th was aided by hourly radar observations from the E.V. HENRY and CDT BARY. These reports clearly showed the sudden change from a slow westerly course to an accelerating east-southeasterly one. While the storm's center did not pass directly over any reporting stations, sustained winds of

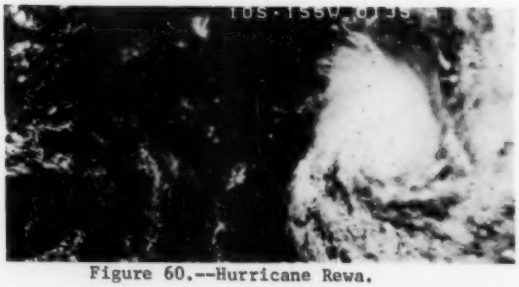


Figure 60.--Hurricane Rewa.

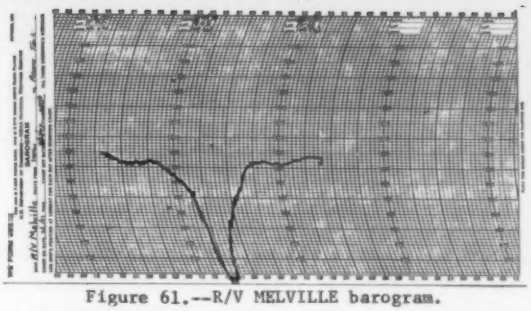


Figure 61.--R/V MELVILLE barogram.

45 to 50 kn were recorded at KauKura, Bora Bora and Hereheretue. On the 9th a ship 20 mi from the center encountered a 75-kn wind while the MELVILLE reported 60 kn winds at 2100 on the 12th and a pressure below 965 mb (fig.61). Satellite pictures showed Rewa reaching peak intensity on the 13th with winds estimated at 100 kn.

As a result of Rewa one person died at Kaukura. The American yacht SUMMER SEAS was lost with a crew of three. There was considerable damage throughout the Society Group. Mataiva Village at Anaa was completely destroyed. Tematangi Island and Hereheretue, in the Duke of Gloucester Islands, were severely damaged. Rewa completed the destruction caused by Nisha/Orama. He was responsible for more than 200 houses being completely destroyed, including 125 houses on Tahiti. In the space of 30 mo Lisa, Nano, Nisha/Orama and Rewa have devastated French Polynesia.

Tomasi formed about 200 mi southwest of Penrhyn Island in the Northern Cook Islands on the 29th. He intensified rapidly and reached hurricane strength late in the day. By early on the 31st he reached his peak and winds were estimated at about 90 kn with gusts to 130 kn. Tomasi maintained this strength for about 40 hr. A valuable report was received during this period from the FETUMOANA some 45 mi from the cyclone's center. She reported winds of 90 kn with "mountainous seas and heavy confused swell". Tomasi passed about 100 mi east of Niue where a maximum gust of 37 kn occurred. Damage on Niue was light.

TROPICAL CYCLONE WATCH--1983

Table 12 is a preliminary list of the global tropical cyclones that have occurred up till press time.

Table 12.--Tropical Cyclone Watch, 1983

Australia-South Pacific				**Eastern North Pacific**			
Jano	07S-83	H	Jan.				
Wen	09S-83	T	Jan.	Adolph	Td-1	H	May
Mark	10S-83	H	Jan.	Barbara	TD-2	H	June
Nann	11S-83	T	Jan.	Cosme	TD-3	T	July
Elinor	13S-83	H	Feb.	Dalila	TD-4	T	July
Nisha	14S-83	H	Feb.	Erick	TD-5	T	July
Oscar	15S-83	H	Feb.	Flossie	TD-6	T	July
Prema	16S-83	T	Feb.	Gil	TD-7	H	July
Ken	17S-83	T	Feb.	Henriette	TD-8	H	July
Rewa	18S-83	H	Mar.	Ismal	TD-10	H	Aug.
Sarah	19S-83	H	Mar.				
Tomasi	20S-83	H	Mar.				
Lena	21S-83	T	April	**Western North Pacific**			
Veena	22S-83	H	April				
William	23S-83	H	April	Sara	TC-1	T	June
Monty	25S-83	T	April	Tip	TC-2	H	July
				Vera	TC-3	H	July
South Indian Ocean				Wayne	TC-4	H	July
Elinah	8S-83	T	Jan.	Abby	TC-5	H	Aug.
---	12S-83	T	Feb.	Ben	TC-7	T	Aug.
Naomi	24S-83	T	April	Carmen	TC-8	T	Aug.
TC 01S		T	July				
				North Atlantic			
North Indian				Alicia		H	Aug.
Aurora	01A	T	Aug.	Barry		H	Aug.

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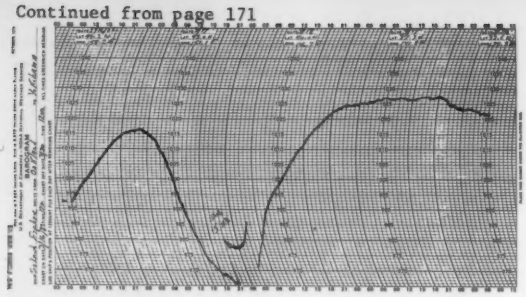


Figure 57.--Barogram from the SEA-LAND EXPLORER.

decreasing on the 20th but the BARBER TENNESSEE (38°N, 167°E) measured 50-kn winds and 36-ft seas.

This was still a large storm at 966 mb on the 21st but the gradient had relaxed producing only gales. The swell had subsided also. It weakened rapidly late on the 22d and disappeared on the 23d. Two ships south of the center had 25- to 30-ft swell waves early on the 23d.

This frontal wave developed over the Yellow Sea late on the 22d. There were a few gales and 20-ft waves on the 24th and 25th. At 0000 on the 26th the LOW was 980 mb near 44°N, 174°E. The wind was gale force and a few storm force. On the 27th the PRESIDENT FILLMORE (45°N, 154°E) had 27-kn northwesterly winds with 35-ft swells. The NISSAN MARU measured 59-kn westerly winds and 26-ft waves. This was now a large two centered LOW but not very intense. The highest wind and wave on the 28th was 50 kn and 33-ft. On the 29th a ship identified as EMKN (54°N, 161°E) had only 12 kn winds but reported 49-ft swells from the east. The storm died on the 31st.

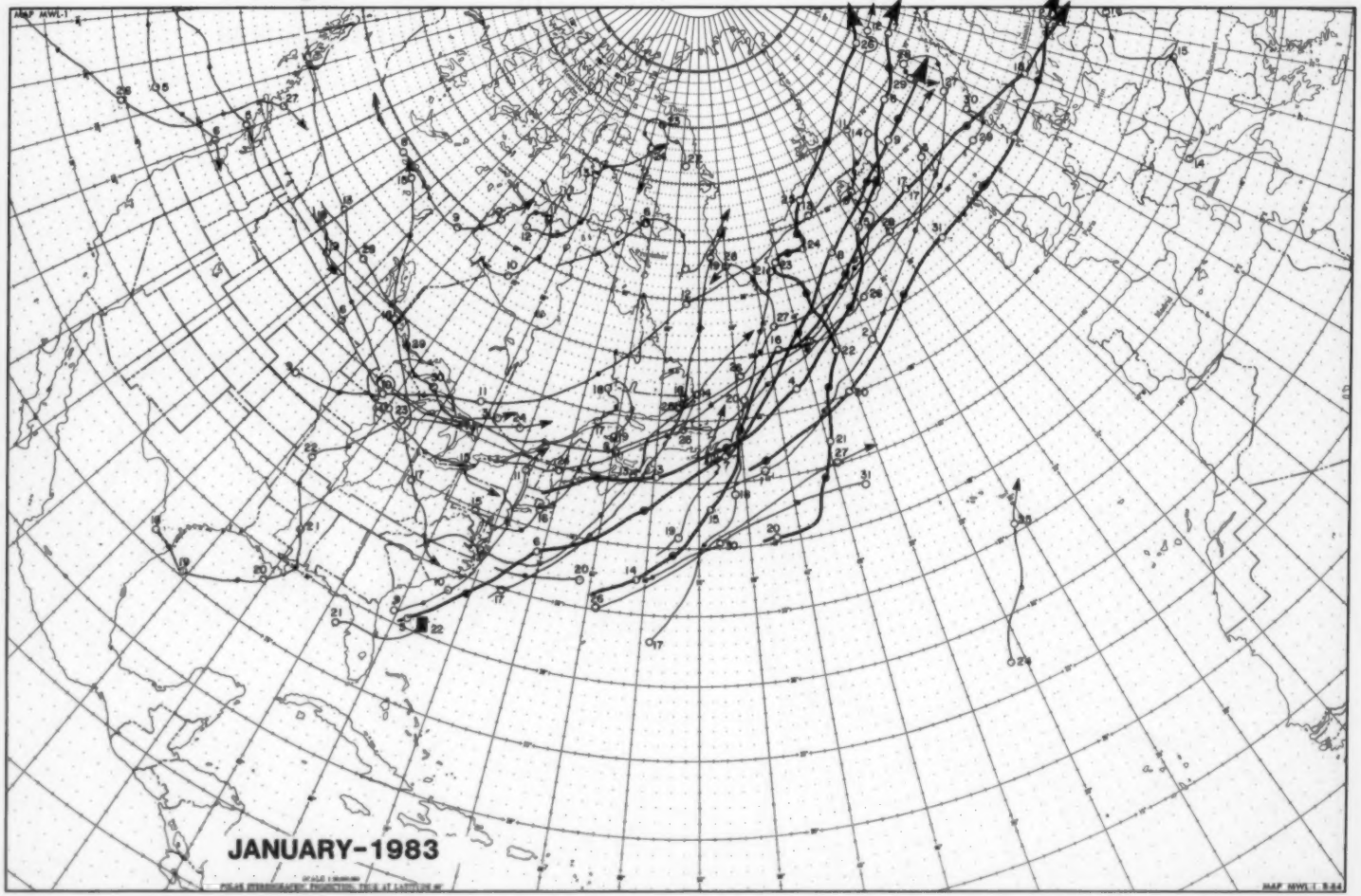
The East China Sea was very prolific this month in giving birth to frontal waves and developing into storms. This one originated on the 26th and traveled eastward as a weak wave through the 30th. It started to deepen as it turned northeastward on the 31st. At 0000 it was 990 mb near 38°N, 159°W. The ABUL KALAM AZAD (35°N, 152°W) had 40-kn southerly winds and 33-ft waves. The ENNA G. (40°N, 155°W) had 55-kn northwesterly winds and 20-ft waves. This storm was noted more for high waves than high winds. At 1800 on April 1 the CRYSTAL STAR (46°N, 139°W) had 45-kn gales and 31-ft seas and swells. The TEMSE (47°N, 132°W) had 40-kn winds, 26-ft seas, and 33-ft swells. At 0000 on the 2d the former ship had 50-kn winds and 31-ft waves, while the later still had 40-kn winds, 13-ft seas, and 49-ft swells. The 978-mb storm was off Vancouver Island. There were quite a few wave reports over 20 ft for such a small storm. The storm quickly deteriorated on the 3d.

Casualties--The river ferry RED STAR 312 capsized in high thunderstorm winds on the West River in southern China on the 1st. Only 86 people of more than 200 aboard survived.

The following reported heavy weather damage this month: ANNIKA N., ARAUCO, DON ANTONIO 1, EDCO, EL GENERAL, FLAG LEADER, FRISKY, HWA SUNG No. 25, KRITI JADE, MALLARD 35, MESSINIAKI AVGI, MICRONESIAN INDEPENDENCE, ODYSSEUS, PACIFIC PEACE, SPLENDID FORTUNE, STAR SINGAPORE.

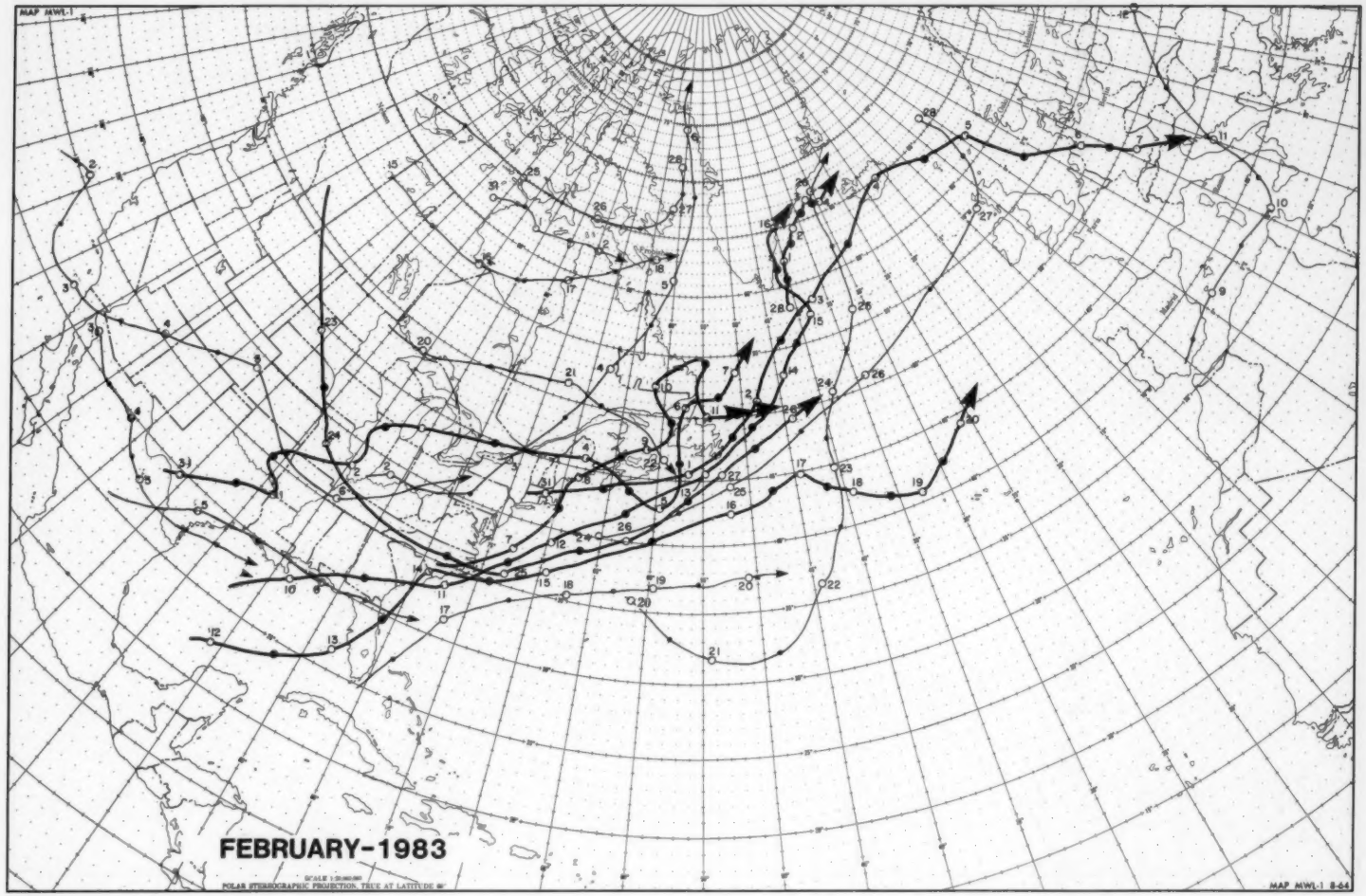
Other Casualties--The Danish Polar supply vessel NANOK S was trapped in pack ice on the 15th near the Australian Antarctic base of Davis. There were 54 passengers and crew aboard. The Russian icebreaker KAPITAN MYSHEVSKLY went to her rescue. The AL QURAIN parted mooring lines at Portland on the 22d. The GANISARI capsized and sank in heavy swells on the 5th near 02°S, 105°E. The FETA MOANA had deck cargo damage off Niue Island. The ATHENE and POLYS collided during heavy weather at Fujairah Anchorage

Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with a heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



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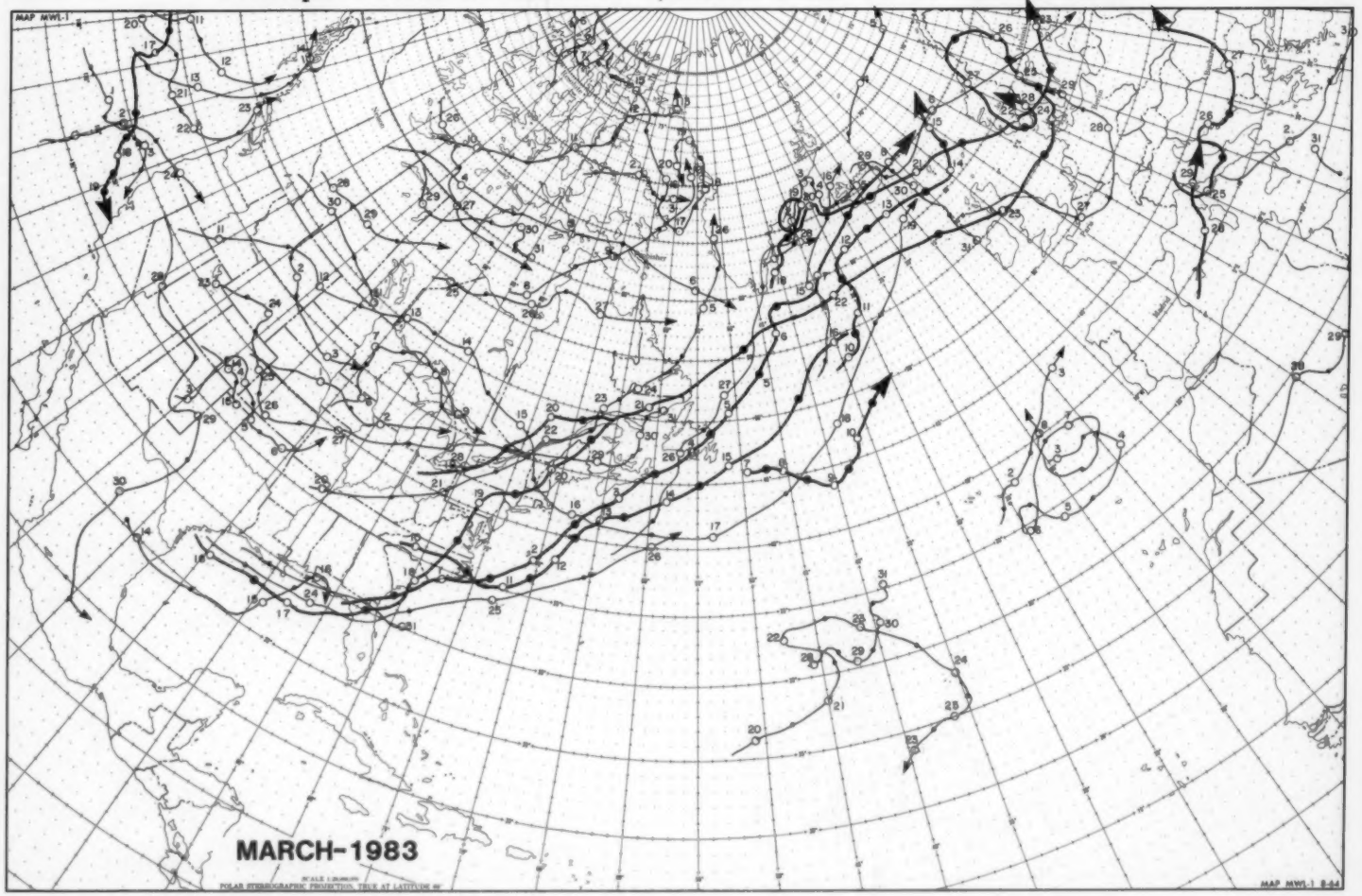
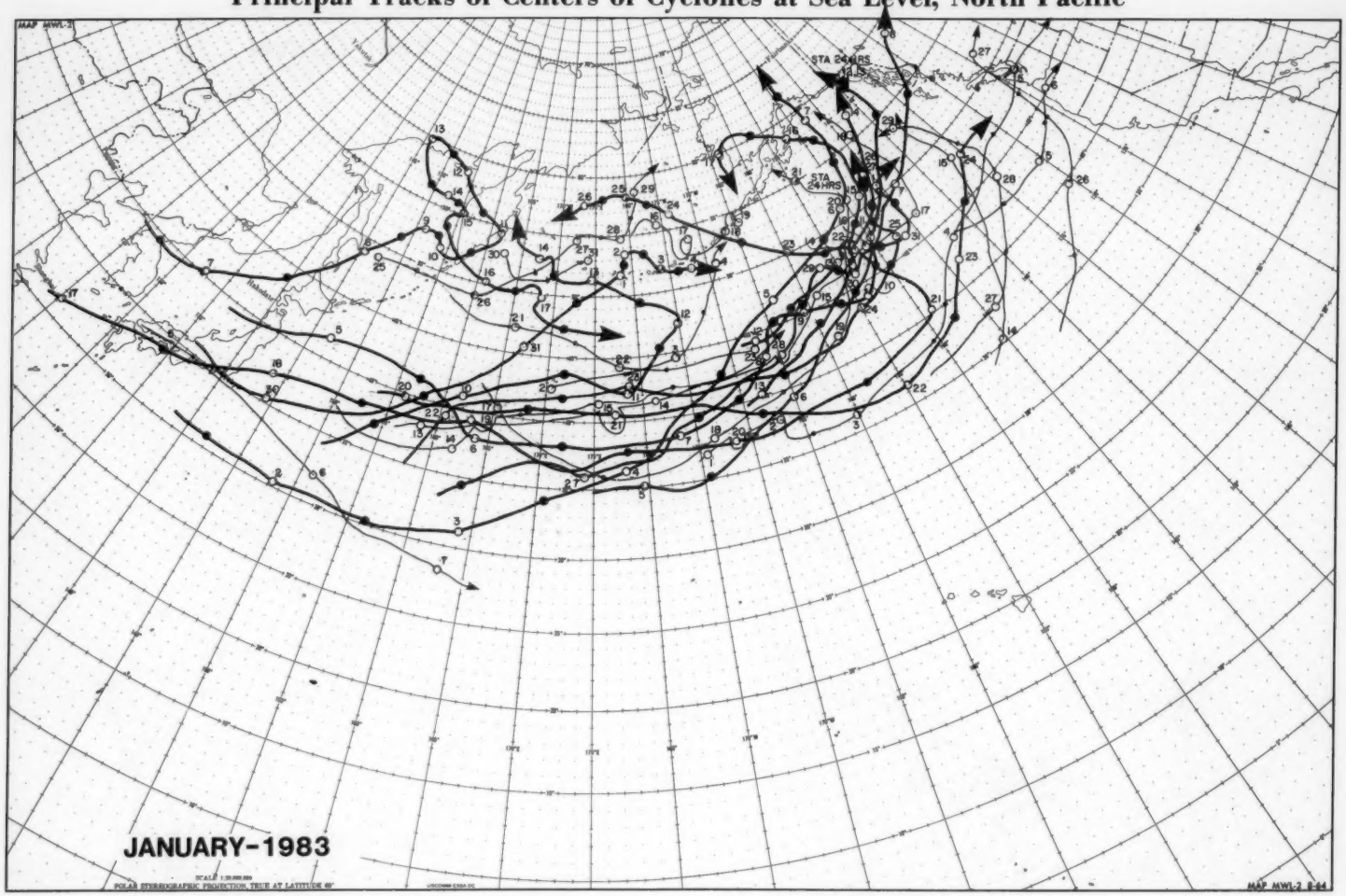
Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with a heavy line are described in the Weather Log.

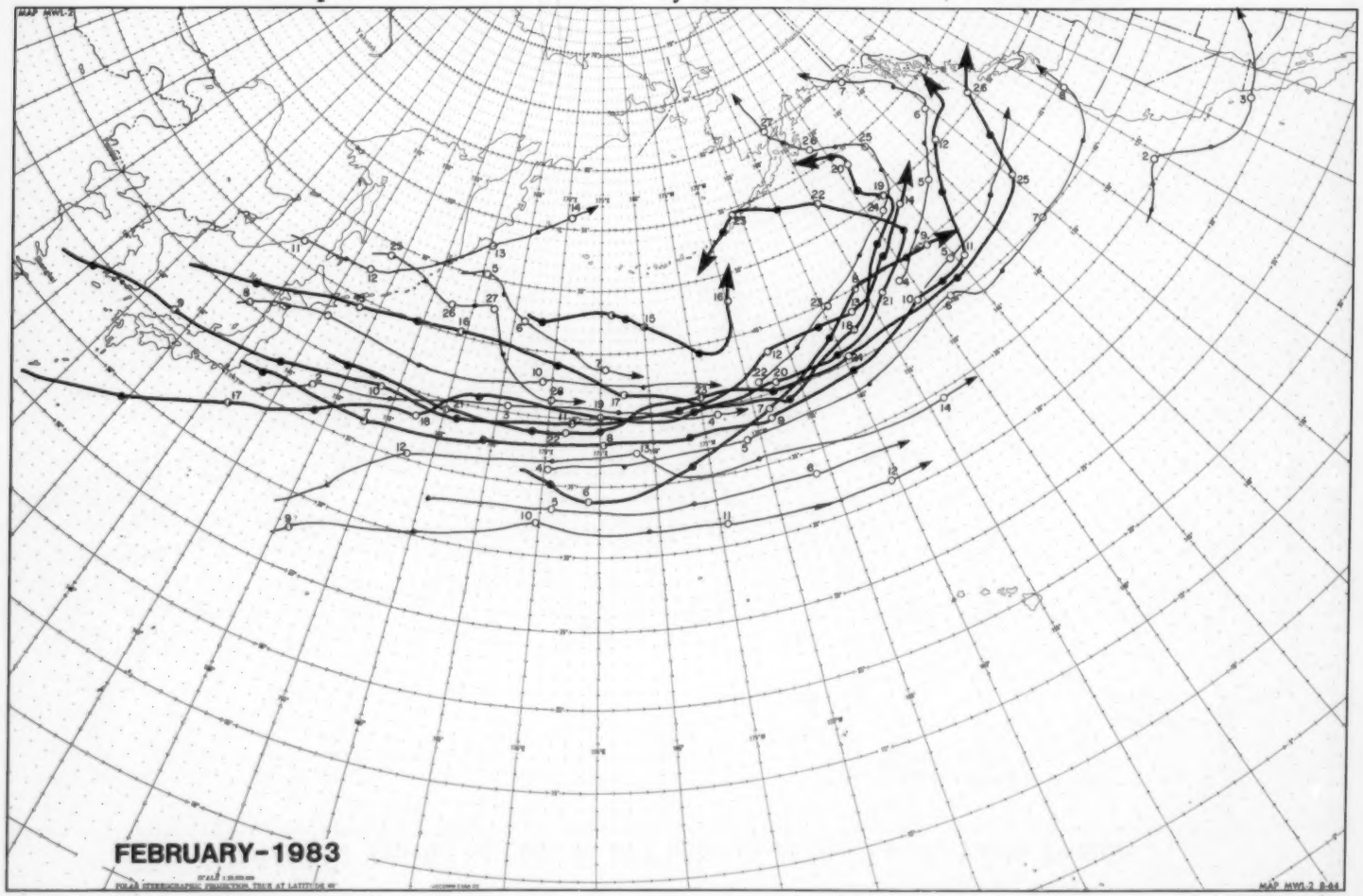
Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with a heavy line are described in the Weather Log.

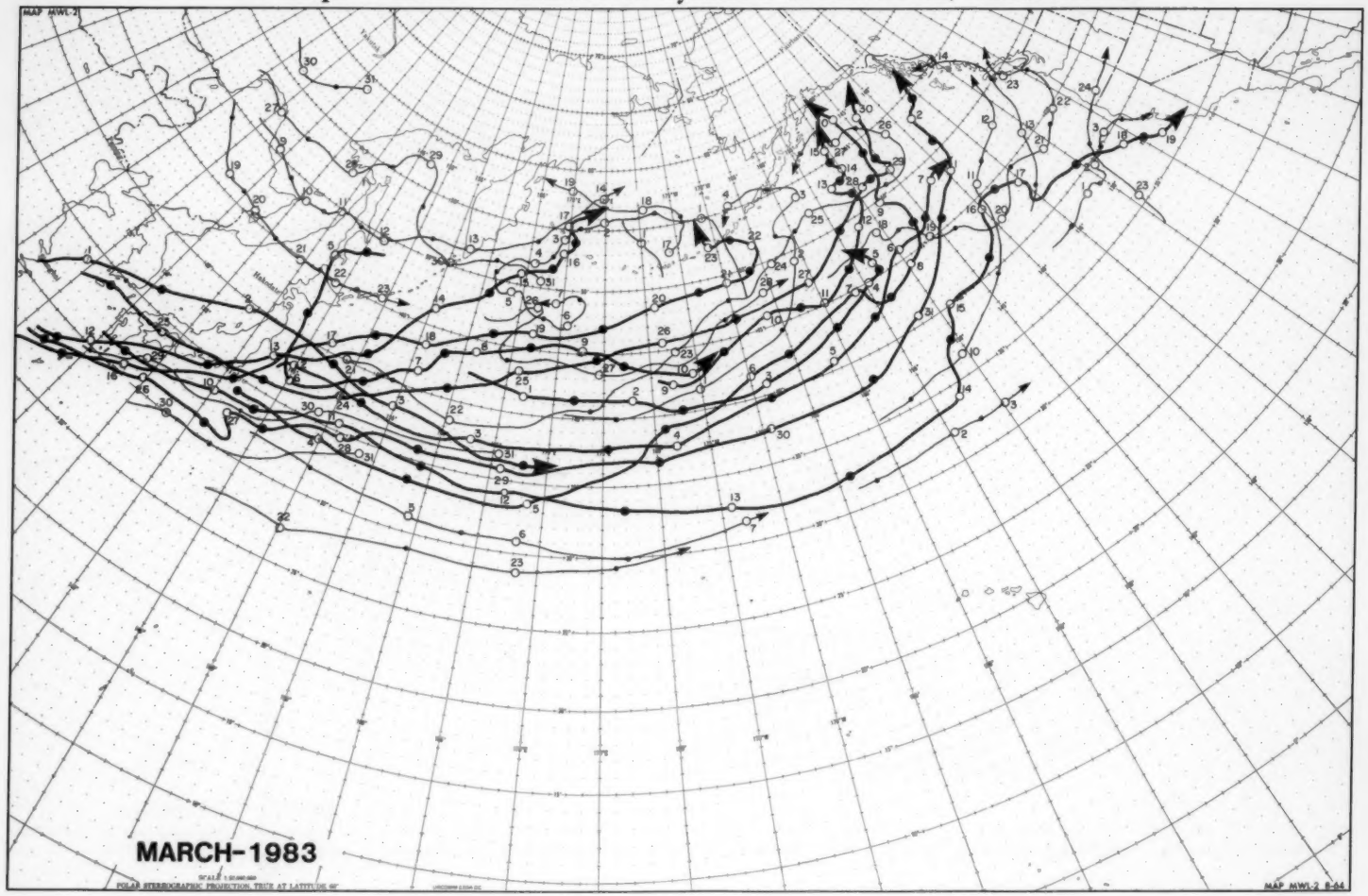
Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with a heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with a heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with a heavy line are described in the Weather Log.

North Atlantic Selected Gale and Wave Observations

January, February and March 1983

Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with a heavy line are described in the Weather Log.

Vessel	Nationality	Date	Position of Ship		Time GMT	Wind		Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C		Sea Waves*			Swell Waves		
			Lat. deg.	Long. deg.		Dir. 10°	Speed kt.				Air	Sea	Period sec.	Height ft.	Dir. 10°	Period sec.*	Height ft.	
	ATLANTIC	JAN.																
ALLTRANS EXPRESS	9VPU	2	38.9	N 46.9	W	12	24	N 47	5	NM	81	1016.0	19.4	21.0	6	10	26	9	16.5
AMERICAN LEADER	KFEJ	2	43.6	N 42.8	W	12	27	45	5	NM	01	1012.8	13.0	18.3	5	10	26	9	14.5
ALLTRANS EXPRESS	9VPU	3	37.3	N 55.8	W	18	23	N 55	5	NM	16	1008.7	21.4	22.0	5	13	22	7	23
AGUADILLA	KADP	5	38.1	N 40.4	W	00	29	45				1016.8	17.8	20.0	4	13	27	7	16.5
EXPORT CHAMPION	WLCG	5	38.3	N 36.2	W	00	23	48	10	NM	02	1020.5	10.3	15.6	6	13	27	8	19.5
MAYAGUEZ	KAAI	7	41.8	N 54.8	W	00	14	40	1	NM	81	1001.0	14.4	8.3	4	13	17	8	29.5
USNS BARTLETT	NBAD	7	40.0	N 66.5	W	15	28	N 26	5	NM		1007.0	7.0	12.2	2	6.5	26	6	32.5
T F L INDEPENDENCE	9VVK	7	45.6	N 41.0	W	18	20	N 60	.25	NM	07	0997.5	15.0	15.5	10	39			
T F L INDEPENDENCE	9VVK	8	47.3	N 34.3	W	12	24	N 25	5	NM	15	1024.0	11.0	11.0	6	16.5	22	12	32.5
WENDY FOSS	WUS300	11	18.3	N 78.9	W	12	10	60	5	NM	03	1013.5	26.5		2	1.5	11	4	3
USNS BARTLETT	NBAD	11	40.6	N 66.9	W	15	13	N 25	.25	NM		1007.5	15.0	11.7	2	6.5	13	8	32.5
SEALAND ADVENTURER	KSLJ	11	39.7	N 64.9	W	18	18	N 45	2	NM	81	1009.7	19.0	21.0	6	13	16	17	26
MAYAGUEZ	KAAI	12	48.5	N 11.3	W	06	21	45				1020.0	11.1	10.0	3	10	28	6	19.5
DA MOSTO	IBRM	14	39.9	N 55.3	W	06	16	45	5	NM	03	1019.0	20.0	22.5	10	16.5			
SEALAND LEADER	WSNH	15	38.5	N 44.2	W	12	24	N 25	2	NM	51	1023.7	18.0	17.0	3	5	24	24	39
AGUADILLA	KADP	16	40.9	N 66.0	W	06	12	45	.5	NM	65	0997.6	10.6	14.4	4	14.5	12	8	16
ITALICA	IBHL	16	33.2	N 70.0	W	12	26	45	2	NM	25	1008.0	14.0	21.0	10	11.5	26	10	10
TEXAS TRADER	KTHC	16	38.4	N 74.0	W	18	29	45	10	NM	00	1004.7	2.2		5	13	29	9	14.5
TEXAS TRADER	KTHC	17	39.3	N 73.6	W	00	28	45	10	NM	01	1006.1	0.0		5	13	27	10	14.5
OVERSEAS MARILYN	WFOB	21	35.9	N 06.7	W	00	09	N 45	10	NM	01	1027.0	13.9	17.2	4	8	09	6	8
EXXON HUNTINGTON	WEAJ	21	31.6	N 79.8	W	12	12	45	5	NM	81	1011.4	19.5	22.2	5	5	12	10	8
DOCTOR LYKES	KHNB	21	43.5	N 32.0	W	18	15	45	2	NM	15	0985.0	14.0	14.0	7	10	15	10	16.5
SEALAND ADVENTURER	KSLJ	21	43.2	N 30.3	W	18	18	N 50	1	NM	62	0989.5	14.5	14.0	5	10	17	10	26
AGUADILLA	KADP	22	49.1	N 23.4	W	06	19	40	2	NM	18	0997.0	11.7	13.3	7	21	19	9	31
NEW JERSEY SUN	KEAL	29	38.8	N 71.9	W	00	05	45	2	NM	91	1010.2	9.5	8.9	4	10	09	10	13
MAYAGUEZ	KAAI	29	37.0	N 70.8	W	12	01	50	5	NM	18	1011.9	15.6	18.3	4	13	36	8	32.5
	ATLANTIC	FEB.																	
AGUADILLA	KADP	1	49.2	N 07.5	W	06	31	42	5	NM	50	1008.6	6.7	12.8	6	10	27	12	32.5
FALSTRIA	OYBG	6	37.4	N 35.9	W	00	14	N 51	2	NM	81	1020.0	16.2		9	16.5			
LASH ITALIA	ELBJ3	7	32.7	N 74.4	W	00	16	N 48	10	NM		1010.0	19.0	20.0	8	16.5			
ALLTRANS EXPRESS	WJAJ	8	36.9	N 64.5	W	06	21	20	2	NM	81	1000.1	17.8	18.9	6	8	28	20	32.5
	9VPU	8	36.3	N 61.1	W	12	19	N 47	2	NM	63	1000.0	19.5	20.8	6	13	20	10	19.5
ALLTRANS EXPRESS	9VPU	9	35.2	N 66.5	W	12	30	N 51	10	NM	03	1008.0	13.5	21.0	7	16.5	30	14	24.5
ARGONAUT	KFDV	9	40.3	N 62.2	W	19	28	45	5	NM	02	0975.0	7.7	5.5	6	13	27	8	10
OGDEN THAMES	6ZDA	11	48.4	N 07.5	W	06	03	N 48				1014.0	5.0	11.0	9	13	01	9	13
USNS APACHE	NIGP	11	32.9	N 71.7	W	12	14	N 45	5	NM	58	1012.5	18.3	22.2	3	6.5	14	14	8
ESSO PALM BEACH	HPID	11	35.3	N 68.0	W	18	13	N 47	10	NM	25	1014.0	17.0		3	6.5	16	7	11.5
HOEGH MERCHANT	LEUX	12	44.8	N 15.7	W	00	06	N 39	5	NM	02	1021.5	10.0		XX	31			
	NNBN	12	40.5	N 69.4	W	06	07	N 50	.5	NM	63	1007.0	3.4	6.1	4	6.5	06	5	19.5
AMERICANA	IBPA	12	42.5	N 61.8	W	12	28	55	.25	NM		1017.0	0.1	9.0	3	11.5			
AMERICAN ALLIANCE	KFEM	13	45.4	N 57.0	W	18	33	50				1004.5	- 3.3	1.1	2	19.5	32	7	29.5
AMERICAN ACCORD	KFEZ	13	45.6	N 56.5	W	18	34	55	2	NM	22	1003.0	- 3.4	2.2	8	26.5			
AMERICAN ACCORD	KFEZ	14	46.5	N 48.7	W	06	32	50	10	NM		1024.0	- 5.0	2.8					
ADM WM M CALLAGHAN	KGYE	14	40.7	N 40.4	W	18	30	45	2	NM	27	0998.5	8.9	15.0	5	11.5	27	7	19.5
SEA LAND VOYAGER	KHRK	14	44.0	N 43.0	W	21	32	52				1001.5	4.0	17.0	9	13	30	16	32.5
SEA LAND VOYAGER	KHRK	15	43.8	N 43.6	W	00	32	52				1006.0	3.0	14.0	12	24.5	30	16	32.5
	ELBJ3	15	35.9	N 74.5	W	06	32	N 45				0997.5	13.0	16.0					
SEALAND INDEPENDENCE	WBJC	15	38.9	N 63.2	W	06	12	52	5	NM	21	0999.0	15.0	18.0	7	16.5			
SANTA CLARA	WLGP	15	32.7	N 74.2	W	06	27	40	1	NM	80	1004.0	15.5	13.4	9	32.5	23	12	16.5
AMERICAN ARGOSY	KFCX	15	34.8	N 74.2	W	14	31	35	5	NM	07	1010.0	13.9	22.8	5	19.5	31	7	32.5
	CSDQ	15	34.6	N 69.9	W	18	32	N 50	2	NM	81	1004.0	18.0	19.0	8	13	27	6	18
ADM WM M CALLAGHAN	KGYE	16	36.2	N 58.6	W	12	32	50	5	NM	82	1000.0	16.8	17.8	8	23	29	7	11.5
SEALAND INDEPENDENCE	WBJC	17	43.6	N 41.5	W	12	18	45				0984.0	14.0	12.0	15	24.5	18	15	29.5
	KMNJ	17	24.3	N 88.5	W	18	28	20	10	NM	01	1014.9	27.8	25.3	2	3	28	28	37.5
SEALAND INDEPENDENCE	WBJC	18	45.7	N 30.9	W	19	10	45	5	NM	02	1003.0	14.0	11.0	10	19.5	10	10	19.5
SEALAND ADVENTURER	KSLJ	19	35.9	N 57.9	W	00	14	N 48	5	NM	80	1000.0	16.0	16.0	4	8	13	7	16.5
AGUADILLA	KADP	19	39.2	N 62.1	W	18	03	50	2	NM	21	0999.1	12.2	21.1	7	29.5	05	9	39
SEALAND INDEPENDENCE	WBJC	19	47.9	N 21.3	W	18	10	48	2	NM	16	1002.0	11.0	10.0	8	19.5	10	8	16.5
ARGONAUT	KFDV	20	33.2	N 62.4	W	18	34	45				1003.0	16.1	18.9	7	16.5	34	8	16.5
AGUADILLA	KADP	21	40.0	N 60.1	W	00	03	45	5	NM	18	1011.0	8.9	19.4	8	19.5	06	9	29.5
ARGONAUT	KFDV	21	31.0	N 59.8	W	06	31	45	5	NM	02	0999.0	18.5	15.5	8	16.5	34	10	29.5
SAN PEDRO	KTSQ	21	27.4	N 70.4	W	18	04	15	10	NM	01	1020.5	20.6	21.7	3	8	03	12	32.5
ADM WM M CALLAGHAN	KCZI	22	30.9	N 37.4	W	00	21	40				1003.5	20.0	18.0	9	23	21	10	32.5
	KGYE	23	44.1	N 43.3	W	06	05	45	2	NM	81	0979.8	14.3	14.0	6	21	06	8	18
SEA LAND VOYAGER	H3DZ	23	41.7	N 44.0	W	18	28	50	1	NM	24	0987.5	11.0	18.0	11	29.5	28	18	46
	KHRK	24	43.4	N 45.0	W	00	35	47	5	NM	24	0991.0		17.0	12	24.5	32	14	26
SEA LAND VOYAGER	H3DZ	24	41.9	N 45.4	W	06	28	50	2	NM	24	1003.0	6.5	18.0	12	29.5	28	18	46
GOLDEN CLOVER	SMPF	24	35.4	N 36.4	W	12	27	N 37	5	NM	01	1012.5	14.5	16.0	12	23	27	16	29.5
TAMAROA WMEC-166	WMEC	24	26.1	N 68.1	W	12	18	N 15	2	NM		1005.0	23.0	22.9	4	5	22	18	31
FALSTRIA	OYBG	24	40.5	N 40.7	W	12	29	N 50	10	NM	82	1002.5	11.0	13.0	16	32.5			
MAYAGUEZ	KAAI	24	44.8	N 36.9	W	18	30	50	2	NM		0999.6	11.7	10.0	9	16.5	30	8	23
T F L INDEPENDENCE	9VVK	25	49.3	N 36.7	W	00	29	N 50	5	NM	20	0983.5	7.5	9.0	8	18	28	20	39
MAYAGUEZ	KAAI	25	44.6	N 39.4	W	00	30	50	5	NM		1009.8	10.3	10.0	8	16.5	30	8	23
AMERICAN ACE	KFCV	25	47.8	N 34.3	W	12	29	45	5	NM	16	1009.8	10.5	13.3	7	24.5	29	8	29.5
AMERICAN LEADER	KFEJ	25	46.1	N 26.8	W	18	26	60	5	NM	02	1014.0	11.1	12.3	8	18	28	13	31
	DZPT	26	15.1	N 97.5	W	00	10	62				1008.1	26.0	26.0	6	6.5	32	7	8
SEA LAND VOYAGER	KHRK	26	47.2	N 23.2	W	00	28	40	10	NM	02	1016.0	11.0	13.0	12	14.5	28	25	32.5
BAYAMON	WIAG	26	31.0	N 72.5	W	18	31	33	10	NM	03	1014.2	17.8	18.7	5	14.5	34	6	32.5
SINCLAIR TEXAS	WJDC	27	24.1	N 94.4	W	06	34	47				1006.0	21.1	21.0	5	11.5	34	8	16.5
T F L INDEPENDENCE	9VVK	27	43.3	N 58.6	W	18	30	N 53	200	YD	26	0994.5	1.0	4.5	12	13	32	12	39
EXPORT FREEDOM	WCJS	27	37.7	N 51.7	W	18	27	45	5	NM	01	0998.0	13.3	18.3	5	8	27	9	19.5
EXPORT FREEDOM	WCJS	28	37.7	N 52.5	W	00	28	45	10	NM	07	1002.5	12.7	19.3	8	13	28	10	18
AMERICAN LEADER	KFEJ	28	41.8	N 48.3	W	12	27	42				1002.7	3.9	6.9	10	29.5	28	22	39
AXEL MAERSK	OXSF	28	41.4	N 53.1	W	12	29	50	5	NM	06	1010.0	6.5		8	29.5			
	SIAN	28	39.1	N 33.6	W	12	19	45	10	NM	91	1010.0	17.5	16.2	6	24			
	KMWJ	28	23.8	N 88.6	W	18	28	47	10	NM	02	1014.6	21.7	25.6	3	11.5	28	5	13
SEALAND INDEPENDENCE	WBJC	28	43.7	N 31.0	W	18	16	34	50	YD	41	1002.0	16.0	12.0	10	29.5	16	16	28

Vessel	Nationality	Date	Position of Ship: Lat. deg.	Position of Ship: Long. deg.	Time GMT	Wind: Dir. 10°	Wind: Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C: Air	Temperature °C: Sea	Sea Waves+: Period sec.	Sea Waves+: Height ft.	Swell Waves: Dir. 10°	Swell Waves: Period sec.°	Swell Waves: Height ft.
	ATLANTIC	MAR.															
SEALAND INDEPENDENCE	WGJC	1	43.3 N	33.8 W	06	27	34	10 NM	02	1006.0	13.0	12.0	11	31	26	9	29.5
ALLTRANS ENTERPRISE	9VVD	2	40.0 N	60.7 W	12	14	M 53	1 NM	10	1004.0	17.8	18.0	7	24.5	13	12	34.5
RESOLUTE	KFDZ	2	40.7 N	61.4 W	18	14	M 45	5 NM	20	0991.0	18.1	19.4	7	16.5	12	6	19.5
SEALAND VENTURE	KLJM	2	31.0 N	55.3 W	18	16	50	5 NM	82	1010.5	18.9	20.6	4	13			
RESOLUTE	KFDZ	3	40.8 N	59.3 W	00	18	M 45			0991.0	15.0	15.0	7	16.5	18	14	19.5
SEALAND PACER	KSLB	3	39.7 N	66.5 W	06	30	M 50	10 NM		0984.0	8.8	17.3	3	6.5	30	6	19.5
SEALAND PACER	KSLB	4	39.2 N	70.1 W	00	31	M 45	10 NM		1008.8	1.0	1.0	4	6.5	31	5	16.5
SEALAND INDEPENDENCE	WGJC	4	40.4 N	60.2 W	12	29	M 50	5 NM	07	1001.5	9.0	12.0	10	24.5	29	10	24.5
SEALAND INDEPENDENCE	WGJC	5	39.8 N	61.9 W	00	29	M 40	10 NM	22	1013.0	11.0	15.0	10	26	29	10	29.5
CHEVRON LONDON	ELYX	5	29.0 N	51.0 W	18	03	M 06	10 NM	01	1026.0	21.4	21.1			29	8	39
SEA LAND VOYAGER	KHRK	7	41.4 N	46.0 W	18	23	45	10 NM	64	0990.5	12.0	17.0	8	8			
SEA LAND VOYAGER	KHRK	8	41.1 N	49.6 W	06	35	51	10 NM	86	0998.2	4.0	10.0	12	19.5			
AMERICANA	IBPA	8	37.2 N	44.1 W	18	29	48	5 NM	25	0998.0	13.0	18.0	12	19.5			
SEALAND ADVENTURER	KSLJ	8	37.8 N	48.3 W	18	31	M 45	5 NM	02	1001.5	10.0	17.0	5	10	32	10	23
AMERICANA	IBPA	9	37.0 N	46.6 W	06	28	50	5 NM	82	1001.0	12.0	18.0	12	23			
SAN PEDRO	KTSQ	9	36.0 N	72.8 W	06	17	50	10 NM	96	1005.5	15.6	22.2	6	6.5	17	6	6.5
WALTER RICE	KCSE	9	33.3 N	39.8 W	12	28	45	10 NM	01	1008.0	16.0	16.1	5	6.5	28	15	23
	ELCJ	9	37.9 N	40.1 W	18	26	M 48	5 NM	15	0999.5	15.0	17.0	8	14.5	27	8	16.5
	GTOQ	9	38.0 N	40.7 W	18	28	40	5 NM	81	0997.8	12.8	15.0	3	13	28	8	32.5
AMERICAN ACCORD	KFEZ	10	45.1 N	30.1 W	18	18	45	5 NM	81	0994.0	14.5	14.5	6	24.5	23	12	29.5
AMERICAN ACCORD	KFEZ	11	44.4 N	34.0 W	06	32	50	5 NM	81	0997.0	11.0	14.5					
MARCONA CONVEYOR	ELDJ	11	27.9 N	78.9 W	12	29	M 55	10 NM	03	1008.8	12.0	22.0	6	8	29	6	8
SAN PEDRO	KTSQ	13	33.7 N	71.3 W	12	29	40	5 NM	02	0999.0	12.8	23.3	10	29.5	29	12	41
DELAWARE II	KNBO	18	33.7 N	77.0 W	00	11	M 48	.5 NM	63	0997.0	18.2	18.6	5	10	10	7	13
AMERICAN TRADER	KVKV	18	34.6 N	73.7 W	06	11	60	5 NM		1005.0	19.4	22.2	8	13	11	8	29.5
BAYAMON	WIAG	19	37.6 N	73.2 W	18	22	38	10 NM	02	0996.0	13.9	5.5	3	6.5	13	9	29.5
BAYAMON	WIAG	20	35.7 N	72.6 W	00	24	25	5 NM	02	1001.0	18.8	12.7	5	8	25	8	41
BALTIMORE	WSIS	24	27.9 N	92.5 W	00	31	45	.5 NM	97	1003.0	15.6	25.0	7	16.5	31	6	16.5
	D9FE	25	34.2 N	76.3 W	00	05	M 65	< 50 YD	59	0990.0	9.0	8.0	12	16.5	05	12	16.5
NEW JERSEY SUN	WEAL	25	34.0 N	76.8 W	00	02	50	.5 NM	82	0988.0	10.6	15.6	8	23	02	6	23
	9MWN	25	29.0 N	69.0 W	05	20	M 55	5 NM	29	1004.8	21.0	21.0	5	8	21	7	10
	KCLZ	25	34.0 N	76.6 W	12	34	45			1010.2	8.4	17.8	3	10	02	7	13
SEA LAND VOYAGER	KHRK	25	49.2 N	12.9 W	12	32	50	5 NM	02	1026.5	11.0	11.0	12	19.5	32	12	14.5
BAYAMON	WIAG	25	38.5 N	74.2 W	12	03	45	10 NM	02	1005.8	6.5	6.1	1	16.5	04	5	16.5
ESSO BAYONNE	ABBT	25	29.4 N	70.5 W	15	27	45	5 NM	07	1008.5	21.0	21.0	11	14.5	22	12	32.5
TFL FREEDOM	9VXX	25	38.0 N	60.2 W	17	14	M 50	.5 NM	63	0997.6	17.5	19.0	5	19.5	15	8	23
	SMKM	25	35.3 N	74.0 W	18	36	M 47			1009.5	9.0	13.0	8	14.5	04	12	16.5
	KDFK	25	40.4 N	63.3 W	18	04	48	1 NM	80	0989.0	11.1	15.6	10	13	05	20	24.5
AMERICAN TRADER	KVKV	25	27.6 N	70.0 W	18	33	50	10 NM	02	1011.2	21.1	22.2	6	10	30	10	19.5
	SMKM	26	33.7 N	74.1 W	00	36	M 45			1016.7	9.0		8	11.5	36	10	14.5
	KDFK	26	40.4 N	65.5 W	00	05	52			0995.6	4.4	15.6					
AMERICAN TRADER	KVKV	26	28.1 N	70.1 W	00	36	45	10 NM	01	1016.0	17.8	22.2	6	10	33	10	19.5
USCGC LIPAN	NBOZ	26	20.5 N	85.4 W	06	13	M 50	5 NM		1014.5	25.7		4	6.5	05	4	8
TFL FREEDOM	9VXX	26	38.9 N	52.0 W	18	19	M 45	1 NM	62	1005.4	19.1	19.5	7	23	18	9	29.5
LASH ATLANTICO	WEZU	26	39.6 N	56.3 W	18	28	M 50	2 NM	52	1010.0	5.0		10	29.5	23	20	42.5
AMERICAN LEGEND	KFEY	27	48.9 N	13.1 W	18	31	45	10 NM	02	1012.5	9.0	11.0	8	13	31	28	16.5
SEALAND PACER	KSLB	29	39.6 N	63.5 W	18	27	M 45	10 NM	02	1006.3	15.6	20.0	4	6.5	27	4	11.5

+ Direction of sea waves same as wind
X Direction or period of waves indeterminate
M Measured wind

NOTE: The observations are selected from those with winds ≥ 40 kn or waves ≥ 20 ft from April through September and 45 kn or 30 ft October through March.

Continued from page 190

TOTAL WEATHER REPORTS RECEIVED FROM US COOPERATIVE OBSERVING SHIPS JANUARY-MARCH 1983

SHIP NAME	VIA RADIO	VIA MAIL
SACRAMENTO	22	16
SAMOA	64	149
SAN PEDRO	38	162
SANTA CLARA	31	81
SANTA JUANA	18	61
SANTA MARIANA		11
SATSUMA	29	37
SCILLA	34	
SEALAND DEFENDER	85	145
SEALAND EXPRESS	51	191
SEALAND LEADER	39	176
SEALAND PIONEER	32	146
SEALIFT ARABIAN SEA	16	
SEPTA	36	89
SIENA	75	130
SINCLAIR TEXAS	17	107
SOHIO INTREPID	29	108
SOUTHWEST CAPE	32	
STATE OF MAINE	11	
STONEWALL JACKSON		30
SUGAR ISLANDER	44	84
T F L LIBERTY		84
TAMARDA WMEC-166	10	16
TEXACO PHODE ISLAND		21
TFL ITALY	193	
THOMPSON PASS	20	51
TOWER BRIDGE	75	29
TYSON LYKES	73	152
USCGC RESOLUTE WMEC 62	13	
USNS MOHAWK		3
USNS WACCAMAW		50
VAN FORT	28	
VEMA	2	
WALCHAND	5	
WENDY FOSS		45
WESTWARD VENTURE	41	44
WILMINGTON GETTY	30	92
YUKON T-AO 152	2	
SAINT LOUIS	22	49
SAMUEL S	4	21
SANKOBRAIN	10	
SANTA CRUZ	45	130
SANTA LUCIA	16	51
SANTA MERCEDES	73	75
SAUDI MAKKAH	41	34
SEA LAND VOYAGER	74	200
SEALAND DEVELOPER	63	98
SEALAND FREEDOM	43	160
SEALAND LIBERATOR	55	151
SEALAND PRODUCER	33	139
SEALIFT MEDITERRANEAN	7	
SHERMAN WMEC 720	13	80
SIMRA	44	149
SKAUGRAN	34	104
SOLON TURMAN	26	
SPRAY DERRICK	7	
STELLA LYKES	7	
STORIS WAGB 38	4	52
SURVEYOR	53	64
TAI CORN	4	57
TAMPA	3	
TEXAS TRADER	35	129
TFL JEFFERSON	15	4
TILLIE LYKES	29	112
TOWNSEND CROMWELL	112	196
ULTRASEA	2	
USNS APACHE	42	32
USNS NEOSHO	2	87
VALIANT	16	29
VAN HAWK	74	167
VENTUROUS WPC 625	1	
WALTER RICE	17	140
WESER EXPRESS	25	24
WESTWIND WAGB 281	107	92
WORLD CANDOUR	7	
ZIM HONGKONG	17	
SALVADOR	7	25
SAN JUAN	5	12
SANSINENA II	26	50
SANTA ELENA	7	19
SANTA MAGDALENA	16	29
SAPPHIRE	21	128
SAUDI RIYADH	38	
SEALAND ADVENTURER	62	161
SEALAND ECONOMY	52	133
SEALAND INDEPENDENCE	67	199
SEALAND PACER	50	171
SEALAND VENTURE	25	112
SEAPAC LEXINGTON	30	59
SHIRLEY LYKES	2	
SINALOA	55	129
SKOUBORD	74	159
SOUTH LIGHT	49	
STAR DIEPPE	69	
STOLT LION	1	
STREAM DOLPHIN	25	14
SWEETBRIER WLB 405	45	
TAINO VENTURE		18
TAURUS	18	89
TFL DEMOCRACY	39	96
THOMAS WASHINGTON	88	212
TONCI TOPIC	41	146
TRANSCOLUMBIA	1	45
UNIVERSE	14	
USNS BARTLETT	13	73
USNS RIGEL TAFS8		57
VALLEY FORGE	4	51
VAN TRIUMPH	27	77
VIENNA WOODS	2	
WASHINGTON TRADER	1	
WESTERN SUN		12
WILLIAM E MUSSMAN	28	194
YOCONA WMEC 168	1	
ZOELLA LYKES	28	
SAN HOUSTON	19	
SAN MARCOS	84	145
SANTA ADELA	25	28
SANTA FE	41	87
SANTA MARIA	45	128
SARGODHA	41	119
SCANSPRUCE	1	
SEALAND CONSUMER	43	87
SEALAND ENDURANCE	43	153
SEALAND INNOVATOR	53	154
SEALAND PATRIOT	43	183
SEALIFT ANTARTIC	15	
SEDGE WLB 402	10	
SHUNWIND	13	15
SINCERE NO 5	17	
SOCONY VACUUM	4	19
SOUTHERN CROSS		46
STAR HONGKONG	108	181
STOLT LLANDAFF	29	135
STREAM HAWSER	6	
T F L INDEPENDENCE	23	117
TALTSMAN	19	
TEXACO GHENT	48	
TFL FREEDOM	59	64
THOMPSON LYKES	23	
TONSINA	27	170
TRIUMPH	60	
USCGC LIPAN		39
USNS COMET TANK 7	75	169
USNS TRUCKEE TAO-147		56
VAN CONQUEROR	29	92
WELMA LYKES	19	
VIOLET	14	22
WECOMA	29	248
WESTWARD		34
WILLIAM HOOPER	10	36
YOUNG SEAGULL	47	68

SUMMARY: GRAND TOTAL VIA RADIO 18056 GRAND TOTAL VIA MAIL 38586

North Pacific Selected Gale and Wave Observations

January, February and March 1983

Vessel	Nationality	Date	Position of Ship		Time GMT	Wind		Visibility n. mi.	Present Weather code	Pressure mb	Temperature °C		Sea Waves*			Swell Waves		
			Lat. deg.	Long. deg.		Dir. 10°	Speed kn.				Air	Sea	Period sec.	Height ft.	Dir. 10°	Period sec.°	Height ft.
	PACIFIC	JAN																
PRESIDENT CLEVELAND	KGXA	1	50.4 N	162.8 E	00	14	65	2 NM	83	1005.3	6.1	2.2	6	13	14	12	34.5
PRESIDENT TRUMAN	WLRL	1	50.6 N	160.7 E	00	16	50	2 NM	85	1003.5	1.2	1.3	10	32.5	17	12	32.5
SONIO INTREPID	KACK	1	50.6 N	131.9 W	12	14	45	2 NM	58	1005.0	7.3	8.8					
	SMKM	1	54.4 N	165.1 W	18	03	N 52	.5 NM	59	0999.5	1.4	5.0	10	14.5	06	10	11.5
QUINTINA	OSFU	2	54.3 N	168.3 W	00	01	N 45	5 NM	45	1007.5	1.0	4.0	5	5	02	18	11.5
SEPTA	ABJO	2	42.1 N	178.2 E	12	08	N 45			0997.5	8.0	10.0	3	10	08	9	16.5
THOMPSON PASS	WSRY	2	14.5 N	95.7 W	17	02	N 47	5 NM	02	1011.4	27.2	25.6	5	16.5	01	5	13
	3ELX	3	29.9 N	162.4 E	18	31	N 45	2 NM	52	0992.0	19.0	21.0	4	11.5	31	5	13
MAIN EXPRESS	3EED	4	50.5 N	131.4 W	00	12	N 35	5 NM		1001.0	7.0	10.0	5	6.5	16	9	32.5
CLIFFORD MAERSK	OXZH	4	36.8 N	175.0 E	06	09	48	1 NM	69		10.9						
VIOLET	H8DF	4	37.9 N	169.5 W	18	16	N 58	.5 NM	61	0985.2	15.4	13.0	8	8	16	8	8
CALIFORNIA RAINBOW	JNJL	4	36.8 N	179.1 E	18	33	N 62	.5 NM	07	0978.0	12.0	15.0	5	8	31	6	13
PRESIDENT TYLER	WEZM	4	39.7 N	165.3 W	18	16	N 48	5 NM	03	0999.0	11.1	10.0	6	10	18	7	13
VIOLET	H8DF	5	38.0 N	167.4 W	00	20	N 56	.25 NM		0985.0	16.0	13.0	9	8	24	9	8
	3ELX	5	27.4 N	174.6 E	18	31	N 45			1019.0	17.0	21.0	4	13	29	5	13
SEPTA	ABJO	5	45.1 N	163.4 W	18	23	N 40	.5 NM	04	0974.5	7.0	7.0	8	31	16	5	13
EASTERN FRIENDSHIP	H8LR	5	34.8 N	179.3 E	18	05	N 50	1 NM	01	0996.0	11.0	18.0	8	10	08	5	8
QUATSINO SOUND	ELAW3	6	50.3 N	138.4 W	18	22	N 32	5 NM		0984.0	7.0		8	29.5	19	10	32.5
SEALAND DEFENDER	KGJB	6	47.9 N	139.2 W	18	23	N 45	5 NM	02	0990.1	10.0	9.0	4	13	24	7	19.5
SEALAND DEFENDER	KGJB	7	48.2 N	140.8 W	00	29	N 44	5 NM	02	0991.2	8.0	9.0	10	32.5	29	13	39
QUATSINO SOUND	ELAW3	7	50.3 N	133.6 W	06	23	N 35			0986.5	7.5		8	29.5	23	10	31
PRINCE WILLIAM SOUND	WSDX	7	51.7 N	131.5 W	06	22	50	10 NM	02	0993.1	8.9	10.0	7	18	19	9	16.5
OCTA	A8GG	8	52.3 N	156.5 W	00	33	N 41	2 NM	84	1001.5	- 1.0	5.0	5	11.5	31	10	34.5
SEALAND DEFENDER	KGJB	8	50.9 N	152.6 W	06	28	N 50	5 NM	02	1004.5	1.0	7.0					
	KD8G	8	44.2 N	153.9 E	12	15	45	.25 NM	65	0996.1	5.6	2.2	4	10	16	8	8
EXXON NORTH SLOPE	KHLQ	8	48.3 N	131.2 W	18	27	38	5 NM	80	1020.0	6.1	6.1	8	10	23	18	34.5
TONSINA	KJDG	8	52.0 N	135.2 W	18	26	45	5 NM	02	1008.1	5.0	6.1	10	19.5	26	12	29.5
ARCO FAIRBANKS	WGWB	8	50.7 N	136.1 W	18	27	50	2 NM	54	1011.2	3.6	9.2	6	29.5	23	12	32.5
EXXON NEW ORLEANS	WNDM	8	50.3 N	132.0 W	18	27	N 38	2 NM	18	1014.0	5.5	1.0	4	13	26	12	36
	ELPA	8	49.1 N	157.7 E	22	13	N 55	< 50 YD	23	0993.0	2.5	4.0	8	32.5	13	7	32.5
ARCO FAIRBANKS	WGWB	9	50.9 N	136.9 W	00	24	38	5 NM		1009.1	5.0	7.0	6	19.5	23	12	32.5
	ELPA	9	49.2 N	158.7 E	01	18	N 55	< 50 YD	23	0987.0	1.5	4.0	8	32.5	15	10	32.5
TONSINA	KJDG	9	49.7 N	132.4 W	06	29	47	5 NM	02	1009.2	8.9	7.2	12	19.5			
PRESIDENT JEFFERSON	WPGE	9	41.3 N	165.4 E	06	18	54	2 NM	62	1016.4	7.8	6.1	4	11.5	19	6	10
BAY BRIDGE	3EYN	9	48.9 N	161.6 E	09	13	N 49	< 50 YD	07	0990.5	2.0	4.0	9	29.5	13	8	26
MAIN EXPRESS	3EED	9	51.0 N	165.6 E	18	14	N 45	2 NM	61	0996.5	2.0	4.0	10	19.5	---	XX	70
KOFUKU MARU	JALG	9	48.6 N	129.9 W	18	26	N 30	.5 NM	45	1012.0	10.0	8.0	8	26	27	8	36
PRESIDENT PIERCE	WUBV	9	44.0 N	170.1 E	18	15	45	1 NM	10	0999.0	5.0	3.1	6	13	14	10	14.5
QUATSINO SOUND	ELAW3	10	50.7 N	129.3 W	00	24	N 15	5 NM		1008.5	7.5		5	10	24	10	31
	OXPS	10	38.7 N	135.0 E	06	32	N 30	.5 NM	84	1019.0		7.0	9	16.5	32	9	32.5
PRESIDENT PIERCE	WUBV	10	45.0 N	174.6 E	06	15	45	5 NM	51	1003.5	5.0	4.4	6	13	14	8	14.5
PACNOBLE	D5YM	11	46.1 N	140.2 W	00	18	N 47	200 YD	45	1006.0	10.0	6.0	8	13	18	15	24.5
	JMST	11	49.9 N	134.5 W	00	18	N 37			1013.0	12.5	9.0	6	19.5	18	8	32.5
	OULU	11	52.9 N	151.6 W	06	36	46	2 NM	84	0987.0	0.0		8	13	05	10	16.5
STAR HONGKONG	ZCKP	11	53.1 N	145.3 W	06	34	N 48	5 NM	00	0967.5	1.8						
SONIO INTREPID	KACK	11	56.3 N	141.7 W	12	03	60	.25 NM	86	0961.0	0.9	6.1					
SEALAND DEFENDER	KGJB	11	51.6 N	165.5 E	12	25	N 47	5 NM	02	0976.4	3.5	9.0			12	8	13
SIENA	OXFU	11	48.5 N	139.7 W	12	24	N 48	5 NM	02	1001.5	10.5						
BROOKS RANGE	WSRP	11	50.8 N	134.7 W	18	25	N 50	5 NM	80	0997.5	2.2	8.3	4	19.5	30	4	19.5
AMERICA SUN	WNEJ	11	55.3 N	136.8 W	18	22	N 52	2 NM	07	0977.5	3.1	5.4	4	6.5	22	8	13
QUATSINO SOUND	ELAW3	12	53.0 N	143.5 W	06	24	N 36	2 NM	62	0993.5	0.5		8	29.5	22	11	39
BROOKS RANGE	WSRP	12	55.2 N	139.2 W	11	22	N 45	10 NM	15	0993.6	1.1	6.1	3	8	22	4	8
THOMPSON PASS	WSRY	12	48.3 N	133.4 W	16	23	N 47	2 NM	62	1009.6	7.2	7.6	3	6.5	26	5	16.5
QUATSINO SOUND	ELAW3	13	54.1 N	148.8 W	00	23	N 28	2 NM	85	0999.5	- 2.0		8	29.5			
CALIFORNIA RAINBOW	JNJL	13	38.2 N	125.0 W	18	11	N 07	5 NM	22	1021.0	13.5	15.0	2	1.5	34	22	34
B T ALASKA	WFQE	13	14.8 N	96.3 W	18	06	45	10 NM	01	1010.5	26.4	28.1	6	16.5	05	12	23
B T ALASKA	WFQE	14	14.3 N	94.8 W	06	01	50	10 NM	02	1010.0	23.3	26.4	11	16.5	05	12	32.5
	WGJF	14	37.6 N	170.3 E	06	30	N 65			0992.2	12.0	13.0	12	32.5	30	12	32.5
BARBER TSU	BMDM	14	36.2 N	179.0 E	12	23	N 54	.5 NM	58	0995.6	15.5						
	LEWT	14	36.7 N	176.1 W	12	22	47			0998.6	15.5		17	16.5	23	17	16.5
AMERICAN LEGION	3ELX	14	27.7 N	138.0 W	18	10	N 10	10 NM	02	1017.5	19.0	24.6	3	5	05	28	49
	WZJC	14	36.9 N	169.5 W	18	23	55	2 NM	61	0994.2	15.0	13.1	10	23	23	15	32.5
	RNDM	15	36.4 N	176.0 W	00	23	N 49	1 NM	50	0999.6	13.6						
KOREAN JUPITER	D7XB	15	37.9 N	176.6 W	00	23	50			0995.0		18.6	6	6.5	26	16	36
AMERICAN LEGION	WZJC	15	37.0 N	165.0 W	06	26	48	2 NM	15	0998.5	13.2	12.6	10	23	34	15	32.5
MOBIL ARCTIC	KSPY	15	09.2 N	89.4 W	18	06	45	10 NM	05	1008.0	27.2	26.6	2	10	06	8	29.5
PHILADELPHIA	WJGO	15	56.4 N	146.0 W	18	09	N 45	5 NM	20	0985.4	3.4	5.0	8	16.5	09	8	16.5
GLACIER BAY	KACP	16	59.8 N	145.5 W	06	06	50	5 NM	21	0999.0	5.6	3.4	7	21	09	9	26
TONSINA	KJDG	17	15.0 N	95.4 W	06	06	50	10 NM	03	1008.6	24.1	25.6	7	11.5			
MISSION SANTA CLARA	WKJD	17	38.3 N	151.3 W	18	23	45	5 NM	01	0991.0	10.6	15.6	6	13	24	8	36
THOMAS WASHINGTON	KGWU	18	11.1 N	103.7 W	00	10	N 15	5 NM	02	1007.5	28.1	28.6	3	3	10	10	32.5
MISSION SANTA CLARA	WKJD	18	39.5 N	150.7 W	00	29	48	> 25 NM	03	0994.1	14.0	13.4	6	13	26	9	32.5
	D7PT	18	36.6 N	153.2 E	18	14	N 50	200 YD	80	1000.0	10.0	15.0	8	16.5	13	8	16.5
ORCO TRADER	SLCI	18	38.7 N	179.8 E	21	29	48	2 NM	63	0991.6	6.1	11.0	9	23			
AMERICAN LYNX	WZJC	19	36.0 N	176.0 E	00	32	35	10 NM	02	1005.5	7.6	15.0	7	23	21	9	32.5
ORCO TRADER	SLCI	19	38.9 N	177.6 W	03	31	50	5 NM	11	0995.5	7.0	11.0	9	24.5			
HOEGH CLIPPER	LICS	19	39.4 N	176.8 E	06	33	45	.25 NM	84	1003.5	5.0	10.1					
CLIFFORD MAERSK	OXZH	19	39.7 N	161.2 W	06	22	50	2 NM	10	0978.5	10.4						
BALTIMORE TRADER	KA5J	19	48.7 N	132.8 W	12	30	45	10 NM		1002.0	5.6	9.4	3	10	30	8	16.5
TONCI TOPIC	ELHX	19	54.3 N	169.0 W	18	35	58	< 50 YD	22	0978.0	- 2.0	3.0	11	21	---	XX	70

Vessel	Nationality	Date	Position of Ship		Time GMT	Wind		Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C		Sea Waves†			Swell Waves		
			Lat. deg.	Long. deg.		Dir. 10°	Speed kt.				Air	Sea	Period sec.	Height ft.	Dir. 10°	Period sec.°	Height ft.	
	PACIFIC	JAN.																
AMERICAN LYNX	EHUK	20	35.4 N	179.4 W	00	23	M 51	1 NM	81	0990.5	14.5							
KOREAN JUPITER	WZJC	20	33.6 N	178.0 W	00	24	50	2 NM	07	0997.5	15.5	14.4	8	32.5	25	8	46	
ALASKA STANDARD	D7XR	20	39.2 N	145.7 W	03	23	29	5 NM	01	0989.0	12.0	14.0	5	10	27	14	32.5	
SAMUEL S	WHDN	20	56.8 N	158.2 W	17	09	45	1 NM	59	0989.2	2.1	5.0	5	5				
	SLNX	20	55.3 N	155.6 W	18	13	M 60	200 YD	97	0982.5	4.0	5.0	9	24.5	13	9	24.5	
PRESIDENT FILLMORE	KRDN	20	49.2 N	141.0 W	16	10	50	2 NM	59	0993.0	5.0	8.3	9	19.5	00	0	0	
ORCO TRADER	SLCI	20	40.7 N	164.7 W	19	31	45	2 NM	36	0990.5	5.0	10.0	8	19.5				
	DZSZ	20	28.7 N	150.1 W	22	26	30	10 NM	02	1009.0	22.5	19.4	6	16.5	27	8	32.5	
	9VDY	21	51.5 N	149.5 W	00	12	M 49	1 NM	97	0999.0	6.5	5.0	9	11.5	14	9	11.5	
KOREAN JUPITER	D7XR	21	37.9 N	136.2 W	00	32	28	10 NM	00	1010.0	12.0	15.0	5	6.5	32	12	29.5	
	ELAK	21	30.0 N	158.9 W	00	21	50	1 NM	07	0997.2	19.0	21.0	10	23	24	13	24.5	
PRESIDENT FILLMORE	KRDN	21	49.4 N	139.4 W	00	18	50	2 NM	07	0994.5	6.1	8.9	9	10	11	8	24.5	
SANSINENA II	WSIN	21	48.7 N	136.4 W	00	12	50	10 NM	01	0998.5	6.1	5.6	6	14.5	13	9	18	
ALASKA STANDARD	WHDN	21	56.8 N	158.2 W	01	09	55	.5 NM	69	0988.0	2.2		6	8				
SEALAND PATRIOT	KHRF	21	52.9 N	149.0 W	06	11	M 54	2 NM	50	0981.0	5.0	5.0	9	21	12	11	23	
	DZSZ	21	28.1 N	153.2 W	09	26	50	1 NM	92	1003.0	19.0	19.1						
	OYBF	21	44.0 N	162.6 E	12	27	50	10 NM	15	1000.0			10	23				
ORCO TRADER	SLCI	21	41.9 N	156.6 W	16	31	45	5 NM	22	0979.0	7.0		7	23				
	D7PI	21	37.4 N	177.6 W	18	23	M 50			0986.5	10.0	14.0	8	16.5	31	8	16.5	
STOLT LLANDAFF	GOZD	21	36.6 N	152.2 W	18	30	50	1 NM	16	0987.9	11.4		7	19.5	29	12	29.5	
ORCO TRADER	SLCI	22	42.1 N	154.6 W	00	28	55			0969.3	6.5		12	29.5				
STOLT LLANDAFF	GOZD	22	36.4 N	150.8 W	00	23	49	5 NM	02	0988.5	12.0	15.0	7	16.5	29	12	32.5	
	9VYT	22	44.2 N	156.2 W	03	32	M 54	.5 NM	10	0961.5	3.0	6.0	7	8	34	12	26	
	DZSZ	22	26.9 N	161.4 W	22	30	40	10 NM	03	1010.5	26.5		7	24.5	30	10	32.5	
	D9DR	23	37.1 N	172.4 E	00	26	M 50			0980.0	16.0		5	6.5	26	6	10	
PRESIDENT TRUMAN	WLRL	23	36.0 N	165.7 E	00	33	45	10 NM	02	0997.0	12.8	15.6	10	16.5	33	10	16.5	
HOHSING ARROW	JENE	23	29.8 N	158.6 E	06	30	M 23	5 NM	21	1010.5	17.0	20.0	8	24.5	30	12	31	
	3GHMZ	23	36.7 N	158.0 E	06	32	M 43	5 NM	90	1010.0	5.0	17.0	12	13	32	13	32.5	
VAN HAWK	D5ZU	23	45.6 N	162.4 W	06	28	M 46	5 NM	00	0975.0	2.5	1.0	15	29.5	29	13	16.5	
DRAGOR MAERSK	OVYZ	23	35.9 N	169.7 E	06	33	50	5 NM	02	0997.6	13.0		8	19.5	27	12	26	
	5MKM	23	40.1 N	179.0 W	18	34	M 62	1 NM	50	0972.5	5.5	6.5	10	16.5	34	10	16.5	
	9VYT	23	40.3 N	141.3 W	18	21	M 55	.5 NM	58	0978.5	8.0	8.5	6	8	22	14	32.5	
	3GHMZ	24	36.4 N	161.9 E	00	32	M 38	10 NM	03	1008.0	7.0	15.0	9	16.5	31	14	41	
	5MKM	24	39.2 N	177.4 W	00	31	M 36			0986.5	6.0	11.5	12	32.5	31	12	32.5	
	9VYT	24	39.7 N	139.0 W	00	29	M 50			0985.0	10.5		18	26	33	18	26	
GLACIER BAY	KACF	24	50.8 N	131.0 W	06	12	60	.5 NM	81	0982.5	6.6	6.6	6	11.5	13	10	19.5	
SOHIO INTREPID	EHUK	24	34.9 N	146.7 W	12	20	M 52	1 NM	81	0990.0	15.0							
	KACK	24	57.0 N	141.3 W	12	07	45			0991.5	2.3	6.7						
BALTIMORE TRADER	KASJ	24	58.1 N	144.0 W	12	09	45	.5 NM	61	0994.0	0.0	6.1	4	6.5	10	8	14.5	
CHEVRON MISSISSIPPI	WXBR	24	32.6 N	154.0 W	12	22	45	> .25 NM	01	0988.0	15.0	15.6	6	11.5	28	12	19.5	
	H9QR	24	47.0 N	146.5 W	17	09	52	.25 NM	58	0992.4	0.5							
VAN HAWK	D5ZU	24	45.8 N	154.0 W	18	08	M 54	2 NM	63	0952.0	4.0	2.0	18	36	08	20	26	
PACIFIC ARROW	JGFM	24	37.4 N	176.7 W	18	32	M 45	2 NM	60	0994.2	7.5							
PORTLAND	WNDF	24	53.6 N	137.7 W	18	13	M 42	5 NM	50	0979.2	6.1	8.9	10	13	09	9	29.5	
AMERICA SUN	WNEJ	24	50.8 N	130.1 W	18	14	M 47	2 NM	10	0984.0	9.5	7.8	5	6.5	14	8	10	
	3GHMZ	25	36.9 N	168.8 E	00	31	M 22	10 NM	90	1019.5	8.0	19.0	8	8	31	11	41	
DRAGOR MAERSK	OVYZ	25	35.8 N	168.9 W	06	30	52	5 NM	02	0998.0	8.9		12	19.5				
CHEVRON MISSISSIPPI	WXBR	25	35.6 N	150.9 W	06	27	55	1 NM	60	0984.1	9.0	13.0	6	24.5	27	10	41	
	KLHG	25	57.1 N	148.6 W	12	07	M 28	5 NM	07	0979.2	4.4		5	10	09	8	29.5	
PRESIDENT TRUMAN	WLRL	25	35.0 N	171.4 W	12	30	45	10 NM	02	1003.2	8.5	13.5	5	16.5	28	7	16.5	
	H9QR	25	47.0 N	140.0 W	17	16	47	1 NM	56	0992.4	0.9							
SARGODHA	OUIU	25	43.5 N	151.1 W	18	28	45	10 NM	01	0963.2	7.4	7.0	6	13	28	13	24.5	
SEALAND FREEDOM	WGJW	25	48.0 N	174.0 W	18	30	M 45	10 NM	01	0988.0	1.5	7.0	5	19.5				
ARCO SAG RIVER	WLDF	25	43.7 N	128.5 W	18	16	M 50	.5 NM	07	0988.0	12.1	10.6			16	11	39	
NEWARK	WNDO	25	50.6 N	129.5 W	18	13	M 50	2 NM	63	0989.0	7.8	8.9	5	16.5	14	6	19.5	
EXXON HOUSTON	KHEA	25	57.2 N	141.0 W	23	12	40	2 NM	58	0979.0	7.4	5.0	8	24.5	12	11	49	
	3GHMZ	26	37.3 N	174.8 E	00	32	M 19	10 NM	03	1012.0	8.0	15.0	8	13	34	8	32.5	
	KLHG	26	55.5 N	148.1 W	00	09	M 14	5 NM		0964.8	5.6		4	10	09	10	29.5	
SARGODHA	OUIU	26	43.5 N	149.8 W	00	28	45	5 NM	81	0966.2	6.6	7.0	7	16.5	26	13	26	
ARCO FAIRBANKS	WGWB	26	58.8 N	144.1 W	00	07	45			0979.0	5.6	5.6	6	13	11	12	41	
NEWARK	WNDO	26	50.6 N	129.7 W	00	13	55	1 NM	63	0980.0	7.8	8.9	10	36.5	13	10	29.5	
CHEVRON MISSISSIPPI	5MKM	26	39.3 N	158.9 W	06	29	M 45	1 NM	50	0994.0	4.5	10.0	10	14.5	30	10	19.5	
	WXBR	26	38.7 N	147.1 W	06	27	40	5 NM	02	0986.1	8.0	12.8	6	16.5	26	12	32.5	
	ELCG3	26	47.4 N	153.6 E	11	05	M 24	1 NM	86	0985.0	1.0	4.0	12	32.5	27	12	32.5	
SOHIO INTREPID	KACK	26	59.6 N	145.6 W	12	36	50	.5 NM	62	0997.0	4.5	6.7	8	23				
	WBWK	26	32.3 N	131.5 W	12	23	45	1 NM	64	0998.0	13.3		10	10	25	15	10	
AMERICA SUN	WNEJ	26	59.1 N	144.3 W	12	07	M 62	2 NM	07	0960.0	5.0	4.5	5	8	10	9	16.5	
B T SAN DIEGO	WSVR	26	57.7 N	143.2 W	12	14	50			0965.0	5.0	4.4	4	19.5	13	9	39	
SKOUBORG	LICN	26	43.8 N	152.9 E	18	33	45	.5 NM	85	1002.5	5.0							
PHILADELPHIA	WJGO	26	57.5 N	142.6 W	18	12	M 40	2 NM	62	0974.0	5.0	4.4	6	11.5	13	9	29.5	
PRINCE WILLIAM SOUND	WSDX	26	39.3 N	124.4 W	18	16	45	2 NM	63	0994.5	14.0	14.4	8	16.5	28	15	23	
EASTERN WORLD	ELVA	26	48.6 N	165.0 W	22	31	M 39	5 NM		0986.4	5.0	3.0	10	29.5	31	15	19.5	
	3GHMZ	27	37.7 N	178.8 W	00	23	M 18	10 NM	03	1018.0	18.0	14.0	5	8	35	4	36	
CLIFFORD MAERSK	OXZH	27	43.7 N	130.9 W	00	28	17	2 NM	25	0984.0	10.7	14.0	4	5	22	14	32.5	
PRINCE WILLIAM SOUND	WSDX	27	40.7 N	125.3 W	00	16	47	2 NM	61	0988.5	13.0	13.4	9	16.5	26	12	19.5	
B T SAN DIEGO	WSVR	27	57.6 N	143.7 W	00	13	33			0973.0	5.0	4.4	4	8	10	15	29.5	
CHEVRON MISSISSIPPI	WXBR	27	43.0 N	145.5 W	00	29	40	10 NM	18	0981.0	7.0	8.3	5	10	27	12	49	
	WBWK	27	30.5 N	133.7 W	06	28	45	5 NM	07	1011.0	15.6		11	13	28	18	19.5	
	KHLR	27	50.3 N	157.2 W	18	29	45	5 NM	25	0979.0	3.3	2.2	7	14.5				
ADRIAN MAERSK	OYIT	27	49.5 N	168.5 E	18	29	45	10 NM	03	0970.8	0.5		4	13	24	9	19.5	
THOMPSON PASS	WSRY	27	14.2 N	95.4 W	18	08	M 47	5 NM	03	1014.5	27.5	26.7	5	14.5				
MING STAR	RLMV	28	35.2 N	170.3 W	00	18	M 51			0993.5	11.5	15.0						
	KHLR	28	50.0 N	156.9 W	00	29	49	5 NM	02	0987.7	3.3	2.2	5	10	29	9	16.5	
	KTRX	28	25.4 N	179.7 E	00	18	46	10 NM	00	1013.0	24.5	22.2	4	6.5	18	9	8	
AMERICAN ASTRONAUT	WZJG	28	36.4 N	171.8 W	00	14	50			0987.0	13.0	13.4	9	11.5	17	8	29.5	
SEALAND FREEDOM	WGJW	28	40.8 N	163.1 E	12	33	M 45	5 NM	22	0995.0	5.0	8.0	5	10	26	10	29.5	
SOHIO INTREPID	KLHG	28	47.1 N	135.2 W	18	12	M 45	.5 NM	58	0971.5	7.2		3	11.5	11	8	23	
	KACK	29	50.4 N	132.4 W	06	17	55	5 NM	01	0984.1	8.1	8.8	7	23	19	13	55.5	
AMERICA SUN	WNEJ	29	59.9 N	138.4 W	12	08	M 47	2 NM	07	0982.1	4.4	4.0	4	8	08	9	11.5	
B T SAN DIEGO	WSVR	29	52.0 N	135.8 W	12	18	45	5 NM	02	0977.9	6.1	5.6	3	10	13	10	24.5	
GLACIER BAY	KACF	29	52.1 N	136.4 W	18	19	50	5 NM	03	0985.0	6.6	6.4	8	16.5	23	8	23	
EXXON HOUSTON	KHRA	29	54.6 N	137.1 W	18	19	30	2 NM	25	0975.0	7.0	6.5	6	10	13	9	32.5	
	S6CT	30	43.5 N	164.6 W	00	31	M 48	2 NM	26	0984.0	4.0	14.0	3	8	32	8	14.5	
BLUE OCEAN	JKQH	31	40.9 N	167.7 E	12	23	M 68	50 YD	46	0980.0	9.0	11.0	10	16.5	23	9	14.5	
OCTA	ABOS	31	39.9 N	169.7 E	18	28	M 49	5 NM	02	0991.5	7.4	10.0	9	16.5	28	10	19.5	

Vessel	Nationality	Date	Position of Ship Lat. deg.	Long. deg.	Time GMT	Wind Dir. 10°	Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb	Temperature °C Air	Sea	Sea Waves* Period sec.	Height ft.	Swell Waves Dir. 10°	Swell Waves Period sec.*	Height ft.
	PACIFIC	FEB.															
AMERICAN TRADER	WEZH	1	35.0 N	158.8 E	00	34	NE 08	10 NM	01	1018.5	8.3	15.6	4	13	34	6	32.5
OCTA	ABOG	1	40.2 N	174.4 E	12	27	N 46	2 NM	83	0996.3	5.0	10.0	7	13	27	12	19.5
ALEUTIAN DEVELOPER	WIPL	1	52.9 N	173.2 W	12	15	NE 20	2 NM	23	0971.3	1.1	3.3	7	21	19	12	29.5
CLIFFORD MAERSK	OXZH	2	50.5 N	161.9 E	06	35	NE 20	2 NM	86	0991.8	0.4		10	29.5	--	XX	72
SEALAND INNOVATOR	WGKF	2	44.3 N	176.6 E	12	27	N 49	10 NM		0982.0	6.0	5.0	6	10	27	13	23
MOBILE MERIDIAN	KGSM	2	49.5 N	127.6 W	18	11	N 14	> 25 NM	17	1014.3	11.0		10	1.5	13	10	32.5
MAIN EXPRESS	3EED	3	36.9 N	176.8 W	12	23	N 51	1 NM	52	0996.5	14.0	14.0					
MAIN EXPRESS	3EED	4	37.3 N	172.5 W	00	23	N 48	2 NM	13	0995.6	14.0	12.0	6	13	25	12	29.5
OCTA	ABOG	4	44.5 N	131.0 W	00	25	N 30	1 NM		1010.3	12.5	12.1	5	14.5	24	11	41
AMERICAN TRADER	WEZH	4	36.3 N	174.9 W	00	23	NE 07	5 NM	02	0999.8	13.9	15.4	4	19.5	23	6	32.5
ROSE	6ZCJ	4	28.3 N	151.2 E	12	27	N 45	2 NM		1010.7	19.8	21.8					
MOBILE MERIDIAN	LLRA	6	47.4 N	125.2 W	17	14	N 45	10 NM	58	0996.8	11.0	13.8	5	8	19	5	8
	KGSM	6	49.6 N	145.2 W	18	13	N 46	2 NM	64	0980.0	9.5	6.0	15	16.5	13	15	16.5
	KSFK	7	50.4 N	134.4 W	00	28	35	10 NM	01	0991.0			8	19.5	26	10	32.5
ASIA HERON	ABDD	7	34.4 N	175.5 W	12	27	N 45	1 NM		1005.0	12.5	15.0					
OCTA	ABOG	7	52.3 N	153.1 W	12	31	N 26	2 NM	70	0988.5	- 1.0	6.0	6	14.5	34	10	29.5
SEALAND DEFENDER	KGJB	8	40.6 N	160.1 W	00	24	N 75	2 NM	68	0965.0	18.0	18.0	7	23	25	12	29.5
SEALAND DEFENDER	KGJB	9	40.5 N	150.1 W	00	27	N 42	10 NM	01	0992.5	9.0	12.0	8	24.5	27	10	29.5
CHEVRON MISSISSIPPI	WXBR	9	43.5 N	128.3 W	12	24	NE 45	5 NM	82	0998.1	6.8	9.4	3	10	25	11	16.5
ORIENTAL KNIGHT	H9VN	9	36.4 N	167.4 W	18	29	22	5 NM	02	0977.5	11.5	12.8	3	8	26	14	32.5
TONSINA	KJDG	9	43.8 N	125.5 W	18	21	SE 53	5 NM	90	1003.3	11.7	10.6	13	19.5			
ORIENTAL KNIGHT	H9VN	10	36.3 N	165.4 W	00	32	SE 55	2 NM	99	0978.5	12.0	12.0	9	14.5	32	15	32.5
ASIA HERON	ABDD	10	35.3 N	155.9 W	12	32	N 46	2 NM	58	0977.0	10.0	14.0					
	6ZBF	10	34.5 N	144.5 W	18	22	N 55	5 NM	07	0988.5	15.5	15.5	7	21	22	7	21
	BLHK	10	33.8 N	126.5 W	18	18	N 18	10 NM	03	1020.0	16.0	16.0	5	6.5	29	20	32.5
PRESIDENT KENNEDY	KCAK	10	35.3 N	152.2 W	18	29	SE 45	5 NM	02	0981.0	11.0	12.8	4	8	29	6	16.5
	SLLP	11	26.4 N	153.6 W	00	18	N 50	1 NM	04	1009.0	18.0	21.0	12	29.5	18	12	26
	6ZBF	11	34.6 N	145.5 W	00	23	N 55	5 NM	07	0982.5	15.5	15.0	7	21	23	12	21
	KGJF	11	35.8 N	157.5 E	00	36	N 50	10 NM	02	1010.0	10.0	15.0	3	8	31	7	11.5
ASIA HERON	ABDD	11	35.4 N	151.6 W	06	29	N 56			0988.0	11.5	13.0	6	16.5	29	15	19.5
PRINCE WILLIAM SOUND	WSDK	11	44.3 N	127.8 W	06	18	N 50	2 NM	50	0998.0	11.8	11.7	XX	19.5	27	XX	16.5
	OVPH	11	42.2 N	126.8 W	12	17	N 48			1002.4	12.8						
	WGXA	11	38.7 N	164.2 E	12	29	45	10 NM	15	1005.5	10.6	15.0	8	18	32	12	24.5
QUATSINO SOUND	ELAW3	11	47.0 N	151.1 W	18	34	N 31	.5 NM	52	0978.0	6.0		7	16.5	09	9	36
BARBER TERRIER	LFEA	11	35.8 N	178.5 E	18	29	N 68	5 NM	91	0999.0	13.0		4	10			
QUATSINO SOUND	6ZBF	12	34.5 N	148.0 W	00	28	N 45	5 NM	21	1003.5	14.0	12.0	6	24	28	10	24
PACIFIC VENTURE	ELAW3	12	47.0 N	149.6 W	00	03	N 12	200 YD	44	0977.0	8.0		3	5	05	9	32.5
	HOVS	12	41.2 N	178.0 E	00	01	N 46	5 NM	07	0990.5	7.2	6.0	9	16.5	01	12	23
PRESIDENT ADAMS	OVPH	12	44.1 N	128.5 W	00	21	N 35			0994.6	12.2	10.0	15	24.5	19	15	29.5
	KAAV	13	39.0 N	127.5 W	00	20	18	10 NM		1009.0	15.6	11.7	5	5	25	30	49
AMERICAN APOLLO	KEOD	13	37.1 N	124.2 W	00	24	20	5 NM		1015.0	14.4	13.9	3	6.5	26	9	31
	BLHK	13	31.4 N	146.4 W	06	18	N 54	50 YD	62	1003.0	17.5	18.0					
	WGXA	13	41.7 N	177.8 W	06	30	30	10 NM	15	1006.0	8.9	8.9	7	13	30	10	29.5
	6ZBF	13	34.5 N	154.5 W	12	24	N 50	2 NM	21	0992.5	18.0	14.0	6	21	24	12	24.5
MAUI	WSLH	13	30.5 N	143.8 W	12	19	N 46	5 NM	03	1006.1	17.2	17.8	9	10	19	8	10
ORIENTAL KNIGHT	H9VN	13	34.0 N	138.8 W	18	18	45	2 NM	81	1004.5	15.0	15.2	8	13	18	10	16.5
	BLHK	14	30.8 N	151.5 W	00	26	N 43			1008.5	18.5	18.0	9	24.5	27	11	29.5
DIANA	D5JV	14	45.4 N	164.0 W	03	34	N 40	1 NM	93	0987.2	5.5	7.0	20	29.5	30	16	21
SINALOA	9HYL	14	22.9 N	173.5 W	05	27	N 16	> 25 NM	83	1015.5	23.1	22.0	4	3	33	10	32.5
	OXNS	14	47.7 N	133.1 W	06	13	N 46	2 NM	61	0996.0	9.8	11.0	16	26			
ATLANTIC PIONEER	6ZBF	14	34.5 N	156.8 W	12	27	N 50	5 NM	13	0997.5	10.0	14.0	6	21	27	12	26
BARBER TERRIER	H3WN	15	44.2 N	169.6 E	18	31	N 46			1006.5	1.0	3.1			31	7	16.5
	LFEA	15	33.9 N	152.0 W	18	23	N 55			0993.0	14.0		6	16.5			
SEALAND FREEDOM	WGJW	15	42.2 N	173.4 E	18	31	N 55	2 NM	72	1000.3	2.5	11.0	10	24.5	33	XX	29.5
MISSION SANTA CLARA	WRJO	15	36.0 N	152.0 W	18	23	36	5 NM	50	0985.0	13.4	15.5	5	11.5	24	8	29.5
GREEN FOREST	H9IB	16	41.7 N	153.1 E	06	25	N 48	5 NM	07	1002.2	3.6	3.6	15	23	30	16	16
	6ZBF	16	34.5 N	166.0 W	12	32	N 45	2 NM	13	0993.5	8.0	14.0	6	19.5	30	8	19.5
	BLHK	16	30.4 N	170.1 W	18	30	N 59	50 YD	59	1012.0	13.0	17.0	10	24.5	29	16	44
	OVPH	16	54.1 N	160.1 W	18	07	N 50	1 NM	63	0975.0	3.3						
GREAT LAND	WFDP	16	57.9 N	147.9 W	18	07	N 46	1 NM	52	0992.3	3.5	6.1	3	5	06	7	10
	WGXA	16	46.2 N	143.6 W	18	22	60	1 NM	25	0973.0	7.8	7.2	8	31	23	15	42.5
QUINTINA	D5FU	16	49.1 N	131.7 W	23	14	N 45	.25 NM	89	0988.5	10.0	8.0	5	5	13	15	6
	6ZBF	17	34.4 N	167.2 W	00	29	N 45	2 NM	82	1001.5	12.0	14.0	6	19.5	30	12	26
SOHIO INTREPID	KACX	17	49.2 N	127.9 W	06	18	45	2 NM	81	0995.0	7.8	10.6	6	14.5	18	6	14.5
	H9CH	17	34.7 N	147.3 E	12	11	N 55	.5 NM	62	0995.5	13.5	17.0					
HOHSING ARROW	3EHE	17	38.0 N	148.7 E	18	09	N 50	1 NM	45	0998.0	6.0	14.0					
	BLHK	17	30.5 N	176.4 W	18	21	N 55	200 YD	62	1003.0	17.0	17.0					
ORIENTAL EXECUTIVE	D5AN	17	36.7 N	150.0 E	18	09	N 54	200 YD	62	0990.0	10.0						
VAN HAWK	D5ZU	17	40.0 N	146.1 E	18	06	N 45	5 NM	03	1004.0	1.0	2.0					
PRESIDENT JEFFERSON	WPDE	17	35.6 N	143.5 E	18	05	50	.5 NM	62	0985.0	10.4	16.7	8	11.5	05	10	19.5
	6ZBF	18	34.5 N	170.0 W	00	27	N 50	2 NM	82	0999.0	13.0	14.5	6	21	27	12	23
	BLHK	18	30.5 N	178.0 W	00	28	N 45	2 NM	18	1010.0	17.0	17.0	6	16.5	30	15	32.5
	HPAH	18	43.6 N	177.0 E	00	29	N 45	10 NM	01	1001.0	5.5	7.0	8	19	32	8	18
AMERICAN LIBERTY	WZJD	18	35.0 N	174.2 W	00	29	55	5 NM	02	0994.0	10.0	11.7	7	32.5	29	8	34.5
SEALAND PATRIOT	KHRF	18	37.5 N	157.0 E	03	11	N 52	1 NM	62	0991.2	9.5	11.0	7	24.5			
ADRIAN MAERSK	OYIT	18	35.6 N	145.5 E	06	27	25	> 25 NM	01	0999.5	15.0	10.0			08	12	32.5
	H9CH	18	35.5 N	151.4 E	09	28	N 55	1 NM	15	0995.0	12.5	10.0					
ORIENTAL EXECUTIVE	D5AN	18	36.8 N	155.3 E	12	25	N 59	200 YD	97	0985.0	12.0						
DISCOVERER 055	WTEA	18	59.8 N	174.9 W	12	04	N 45	2 NM	93	1011.9		0.0	5	5			
CHEVRON MISSISSIPPI	WXBR	18	38.6 N	153.6 W	12	24	50	2 NM	82	0998.0	10.0	10.0	3	11.5	27	12	28
SKOUBORD	DZ56	18	35.0 N	157.7 E	18	25	47			0995.8	14.0						
PRESIDENT GRANT	LIQN	18	38.0 N	145.5 W	18	20	45	2 NM	81	0997.0	15.0	12.5	6	11.5	28	10	19.5
ROBERT D CONRAD	WEZD	18	36.8 N	139.8 W	18	19	N 50	10 NM	03	1013.1	12.5	12.8	5	10	19	11	23
ARCO SAG RIVER	WHBA	18	38.2 N	123.5 W	18	28	50	5 NM	16	1016.0	14.5	14.0	5	16.5	28	6	16.5
	WLDF	18	31.1 N	157.1 W	18	29	N 28	5 NM	02	1009.6	13.9	12.4	6	10	27	10	29.5
ORIENTAL EXECUTIVE	D5AN	19	36.7 N	159.6 E	00	18	N 50	1 NM		0996.5	11.0						
	DZ56	19	35.1 N	158.0 E	03	24	46			0999.5	14.5		12	23	24	14	23
AMERICAN LIBERTY	WZJD	19	36.2 N	168.5 W	03	27	30	10 NM	02	1016.0	13.3	10.5	5	8	27	8	32.5
SEALAND PATRIOT	KHRF	19	37.1 N	166.1 E	03	25	N 49	.5 NM	44	0988.0	14.0	11.0	7	21			
CHEVRON MISSISSIPPI	WXBR	19	37.1 N	153.6 W	03	27	50	10 NM	62	1001.8	9.5	10.0	3	11.5	24	11	29.5
SHERMAN WMEC 720	NMRJ	19	53.2 N	169.0 W	04	04	N 45	5 NM	07	0991.5	- 2.0	2.0	XX	19.5			

Vessel	Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir. 10°	Wind	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb	Temperature °C Air	Temperature °C Sea	Sea Waves* Period sec.	Sea Waves* Height ft.	Swell Waves Dir. 10°	Swell Waves Period sec.*	Swell Waves Height ft.
	PACIFIC	FEB.																
MOBILE MERIDIAN	KGSN	19	51.3 N	131.6 W	11	16	M	74	5 NM	07	0997.3	7.8	8.7	6	16.5	16	7	16.5
	WNEZ	19	44.1 N	128.9 W	12	18	M	45	10 NM	02	1010.4	12.2	7.8	8	10	18	5	10
ALEUTIAN DEVELOPER	WIPL	19	54.7 N	162.9 W	18	34		55	5 NM	02	0988.0	- 8.4	1.6	5	13	35	8	13
SANSINENA II	WSIN	19	52.6 N	139.3 W	18	18		50	2 NM	62	0972.0	6.7	4.4	8	24.5	18	14	36.*
HONSING ARROW	3ENE	20	38.9 N	159.4 E	05	27	M	37	5 NM	21	1004.5	14.0	15.0	8	28	27	10	29
PRESIDENT JEFFERSON	WP6E	20	36.0 N	165.4 E	06	26		55	10 NM	02	1000.1	11.1	13.3	3	6.5	29	4	19.5
SIMBA	OWEC	20	36.2 N	152.4 E	12	27	M	47	10 NM	02	1009.0	11.0	12.0	8	8	28	8	10
	6ZBF	21	34.6 N	176.3 E	00	27		45	5 NM	03	1000.0	17.5	17.5	8	29.5	27	7	29.5
KEIYO	JKHQ	21	45.4 N	144.8 W	12	11	M	48	.25 NM		0983.0	7.5	8.0	7	10	04	4	8
SKAUGRAN	BMDM	21	35.6 N	161.0 E	18	29	M	47	10 NM	01	1000.0	11.0						
	LMUK	21	40.0 N	143.5 E	18	28	M	47	5 NM	67	1017.0	- 2.0						
	6ZBF	22	34.4 N	171.5 E	00	27		45	5 NM	03	0996.0	17.5	17.5	9	10	23	6	14.5
	D5BK	22	38.3 N	171.1 E	12	26	M	56	2 NM	05	0984.0	9.0	11.0	7	10	27	9	24.5
KEIYO	JKHQ	22	46.5 N	137.9 W	12	11	M	48			0982.0	7.0	8.0	5	6.5	06	6	11.5
HONSING ARROW	3ENE	22	35.5 N	174.5 E	18	27	M	31	5 NM	60	0993.0	10.0	15.0	8	29.5			
	BMDM	22	35.5 N	169.9 E	18	28	M	51			0994.2	10.0						
PACIFIC ARROW	J6FM	22	37.5 N	173.6 E	18	26	M	52	5 NM	15	0984.5	9.5						
SIMBA	OWEC	22	37.4 N	170.4 E	18	29	M	62			0985.0	9.6	14.0	6	23			
	6ZBF	23	33.5 N	169.0 E	00	28		50	10 NM	03	0998.0	15.5	15.5	8	21	28	7	14.5
	BMDM	23	35.6 N	172.0 E	00	27	M	52	5 NM	01	0994.0	12.0						
GALLEON TOURMALINE	DZJB	23	36.2 N	173.1 E	00	26	M	57	10 NM		0986.0	10.0	11.0	6	8	26	8	11.5
PACIFIC ARROW	J6FM	23	37.7 N	175.6 E	00	25	M	29	.25 NM	55	0980.0	10.5	10.3	8	16.5	20	12	32.5
SIMBA	OWEC	23	37.0 N	172.3 E	00	29	M	54	5 NM		0989.0	9.2	14.0	6	23			
HONSING ARROW	3ENE	23	35.6 N	177.7 E	06	27	M	45	2 NM	62	0989.5	11.0	13.0	9	29.5			
TAI CORN	BHFD	23	34.8 N	171.5 E	06	29	M	52	200 YD	81	0987.3	7.5	10.5	10	16.5	30	12	16.5
PRESIDENT JEFFERSON	WP6E	23	37.4 N	162.2 W	06	24		62	5 NM		0987.0	13.9	10.0	6	11.5	23	8	19.5
	6ZBF	24	33.5 N	167.0 E	00	27		45	10 NM	03	1011.5	13.5	13.5	9	19.5	32	9	18
ADRIAN MAERSK	OYIT	24	43.3 N	150.1 W	06	25		50	10 NM	25	0981.5	8.2	8.0	6	19.5	23	10	16.5
TAIKO VENTURE	A8UB	24	51.4 N	136.9 W	23	15	M	32	1 NM		0980.0	7.5	7.5	6	8	13	12	32.5
PACIFIC VENTURE	HOVS	25	50.5 N	179.8 E	06	33	M	45	1 NM	18	0988.5	0.5	- 2.0	7	13	33	11	21
ALEUTIAN DEVELOPER	WIPL	26	57.1 N	152.8 W	00	02		50	5 NM		0980.4	3.9	2.8	6	19.5	13	10	24.5
AMERICA SUN	WNEJ	26	51.0 N	136.1 W	12	36	M	45	5 NM		0984.8	6.5	6.1	5	8	34	5	11.5
RENAI	WSNB	26	50.8 N	135.2 W	18	32	M	45	2 NM	62	0984.2	3.3	4.7	10	16	27	12	21
	6ZBF	27	34.5 N	150.5 E	00	29	M	48	5 NM	25	1011.0	10.0	10.0	4	14.5	30	5	14.5
QUATSINO SOUND	ELAW3	27	44.8 N	150.5 E	00	31	M	44	1 NM	07	0997.5	- 5.0	6.0	10	29.5			
	JAJL	27	35.4 N	152.2 E	03	28	M	46	5 NM	02	1008.5	8.0	18.0	4	8	30	6	11.5
	D9FE	27	35.1 N	164.6 W	06	31	M	45			1006.5	6.0	11.0	13	16.5	31	13	16.5
HONSING ARROW	3ENE	27	35.4 N	157.1 W	12	32	M	57	1 NM	82	0999.0	11.0	13.0					
ARCTIC TOKYO	5LJT	28	39.3 N	148.3 E	06	32	M	45	5 NM	02	1023.0	1.0	9.0					
AFRICAN DAWN	WLDP	28	26.7 N	149.5 W	06	30		35	5 NM	03	1017.3	16.8	21.6	4	10	30	17	29.5
ASIA BRAVERY	A8CN	28	36.7 N	150.4 E	11	29	M	45	.5 NM	48	1020.0	4.0	14.0	5	14.5	34	7	18
	ATJL	28	31.5 N	129.3 W	18	25		55	10 NM	50	0998.2	18.0		10	8	24	18	13
CHUEN ON	H3GX	28	43.5 N	170.3 W	18	21	M	47			0982.0	5.0	8.0	8	14.5	18	8	14.5
MANULANI	KNIJ	28	29.0 N	144.9 W	18	28	M	48	5 NM	07	1008.0	15.0	19.4	8	24.5	30	16	41
DRAGOR MAERSK	OYYZ	28	45.0 N	139.0 W	18	06		38	5 NM	06	0998.0	8.8		21	19.5	05	15	32.5
B T ALASKA	WFQE	28	38.4 N	129.1 W	18	15		45	2 NM	51	0994.0	14.4	13.3	8	10	15	10	19.5
	YCS6	28	36.7 N	146.1 W	18	32	M	54	.5 NM	96	0992.5	11.5	12.0	12	19.5	33	13	19.5
	PACIFIC	MAR.																
	YCS6	1	35.7 N	146.0 W	00	32	M	60	.5 NM	07	0998.5	14.0	12.0	20	44	31	20	44
SINALOA	OXMS	1	27.9 N	136.1 W	06	27	M	54	10 NM	25	1001.0	17.2	20.0	11	36	29	12	26
AMERICAN LEGION	WZJC	1	30.8 N	133.5 W	17	29		51	2 NM	15		13.9	15.6	5	8	28	17	42.8
MANULANI	KNIJ	1	32.3 N	139.1 W	18	30	M	45	5 NM	03	0997.0	17.2	17.2	8	28	30	16	36
AMERICAN LEGION	WZJC	2	30.2 N	134.0 W	00	28		48	5 NM	15	0994.0	14.4	15.6	5	8	28	15	41
MANULANI	KNIJ	2	36.2 N	135.6 W	12	28	M	45	5 NM	15	0988.0	11.7	13.9	8	19.5	30	16	26
BOGASARI DUA	PLYA	2	32.9 N	174.0 E	18	31	M	46			1006.8	18.7	17.0	4	11.5	30	11	14.5
	JAJL	2	35.2 N	175.8 E	21	29	M	56	2 NM	79	1004.0	4.0	14.0	5	10	32	9	16.5
	SLWE	3	33.7 N	142.5 E	00	26	M	45	5 NM	01	1007.5	20.5	18.0	6	26	26	7	13
AMERICAN LANCER	WZJB	3	36.4 N	177.9 E	06	32		45	5 NM	02	1008.0	6.7	11.1	7	19.5	32	12	19.5
	D7PT	3	36.1 N	164.5 E	12	23	M	45	2 NM	12	0992.5	14.0	14.0	3	8	23	4	10
	WHRN	3	45.2 N	167.9 W	18	03	M	45	10 NM	02	0987.0	3.3	5.6	5	8	07	8	18
	WHRN	4	45.2 N	165.3 W	00	03	M	45	10 NM	02	0987.2	3.9	5.0	6	19.5	04	13	28
B T ALASKA	WFQE	4	49.4 N	129.3 W	06	35		50	10 NM	00	1001.6	6.3	10.0	5	16.5	35	8	23
CHUEN ON	H3GX	4	47.1 N	146.6 W	12	15	M	39	1 NM		0988.0	7.5	8.0	10	29.5	15	10	29.5
BOGASARI DUA	PLYA	4	35.3 N	175.0 W	18	27	M	57	.5 NM	05	0983.0	10.0	13.0	12	14.5	27	11	14.5
	JAJL	4	35.9 N	171.6 W	21	25	M	47			0983.0	12.0	13.0	4	6.5	26	9	16.5
ATIGUN PASS	KSFJ	5	22.6 N	110.9 W	00	29		30	10 NM		1012.0	22.2	22.8	6	8	29	10	29.5
HOEGH CAIRN	LICX	5	42.9 N	175.8 W	00	04		45	.25 NM	62	0981.0	4.0	7.2	9	16.5	08	12	23
BOGASARI DUA	PLYA	5	35.4 N	178.0 W	00	27	M	63	.25 NM	05	0990.5	13.5	13.0	0	39	24	XX	37.5
PRESIDENT GRANT	JAJL	5	36.5 N	169.4 W	06	27	M	69	1 NM	07	0986.0	11.0	14.0	4	8	27	10	29.5
	WEZD	5	46.0 N	157.7 E	06	31	M	50	5 NM	02	0987.0	0.0	2.8	12	19.5	31	12	16.5
	WPGH	6	43.7 N	179.5 E	00	09	M	28	5 NM	04	0998.0	4.0		XX	23	18	14	41
JAPAN ACE	JKFS	6	37.4 N	153.6 W	00	25	M	45	2 NM	50	0982.0	13.5	11.5	10	18	24	12	23
	D7PY	7	36.7 N	158.8 W	18	18	M	50	2 NM	12	0987.0	10.0	11.0	4	6.5	17	4	6.5
EVER SPRING	3EU8	7	44.4 N	168.0 E	23	09	M	48	.25 NM	37	0982.0	6.0	2.0	6	11.5	09	6	11.5
ROSE	H3WZ	9	35.5 N	156.8 E	12	26	M	51	5 NM	24	1003.0	6.0	11.0	8	19.5	30	10	24.5
	6ZCJ	10	37.6 N	179.2 W	12	27	M	45	5 NM		0990.5	6.0	12.0					
PRESIDENT JACKSON	KADB	10	43.9 N	174.9 W	18	36		52	5 NM	07	0977.5	2.8	5.6	8	32.5	08	18	16.5
DISCOVERER OSS	WTEA	11	39.9 N	170.0 W	00	25	M	56	5 NM	03	0975.5	8.5	9.6	8	24.5			
MAIN EXPRESS	A8XN	11	37.3 N	147.2 E	07	09	M	48	2 NM	62	1001.0	10.0	14.0	4	6.5	11	8	10
	3EED	11	34.7 N	155.9 E	12	14	M	45	2 NM	63	1010.0	9.0	14.0					
ROSE	6ZCJ	11	37.2 N	172.2 W	12	28	M	45	2 NM		0992.0	6.5	12.5					
B T ALASKA	WFQE	11	46.1 N	130.9 W	18	13		45	5 NM	20	0997.0	10.6	7.8	9	13	17	10	16.5
MOBILE MERIDIAN	KGSN	11	49.3 N	128.2 W	23	14	M	66	5 NM	03	1003.5	10.0	8.9	6	19.5	17	7	16.5
MAIN EXPRESS	3EED	12	34.9 N	159.5 E	00	12	M	55	5 NM	81	0996.5	12.0	14.0	13	32.5	13	13	32.5
PRINCE WILLIAM SOUND	WSDX	12	50.9 N	133.5 W	00	13		59	2 NM	63	0991.5	7.8	8.9	6	11.5	13	8	13
ANNA MAERSK	OYK5	12	35.4 N	155.8 E	04	04		45	2 NM	81	1010.5	13.0						
MING STAR	BLNV	12	33.2 N	156.0 W	12	26	M	45	10 NM	02	1003.0	10.0	14.5					
TONSINA	WJD8	12	41.3 N	127.4 W	12	23		30	5 NM	25	1001.0	13.3	10.0	6	16.5	18	10	32.5
ALASKA STANDARD	WHDN	12	59.1 N	149.6 W	18	04		50	2 NM	65	0985.4	3.3	5.8	4	8	06	5	13
B T ALASKA	WFQE	13	40.6 N	125.9 W	06	16		45	2 NM	21	0995.0	13.9	12.2					
ALEUTIAN DEVELOPER	WIPL	13	54.8 N	162.7 W	06	01		55			0989.0	- 3.8	3.3	5	11.5			
TONEI TOPIC	ELKX	13	48.4 N	157.4 E	18	18	M	47	2 NM	26	1004.0	1.0	1.8	6	11.5			
	H3WP	13	50.4 N	162.9 E	18	25	M	45	2 NM	78	0999.5	0.5	3.0	9	14.5	25	9	14.5

Vessel	Nationality	Date	Position of Ship		Time GMT	Wind		Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C		Sea Waves*			Swell Waves		
			Lat. deg.	Long. deg.		Dir. true	Speed kt.				Air	Sea	Period sec.	Height ft.	Dir. true	Period sec.+	Height ft.	
	PACIFIC	MAR.																
PRESIDENT JEFFERSON	WPGE	13	40.7 N	146.3 E	18	02	50		75		2.2							
	A8XN	14	39.7 N	157.0 E	00	18	M 55	.5 NM	52	0998.5	12.0	12.0	XX	13	17	7	19.5	
PRESIDENT JEFFERSON	WPGE	14	38.5 N	144.2 E	06	32	50	5 NM	26	1003.2	1.1	7.8	8	8	33	15	19.5	
ARCTIC TOKYO	SLJT	14	43.3 N	154.0 E	12	22	M 55	< 50 YD	64		2.0	0.0						
DAFFODIL	H3AS	14	50.1 N	158.9 E	12	08	M 50	< 50 YD		0975.5		4.0	7	19.5	08	6	14.5	
	ELHK	14	37.4 N	156.4 W	18	35	M 60	.5 NM	21	0983.0	6.0	9.0	8	32.5				
QUATSINO SOUND	ELAW3	14	40.3 N	160.9 E	18	27	M 47			0994.5	4.0		10	21				
TONCI TOPIC	ELHX	14	45.0 N	151.9 E	18	36	45	< 50 YD	22	0981.5	- 2.0	1.0	7	19.5				
	H3WP	14	48.5 N	155.0 E	18	02	M 45	1 NM	86	0955.0	2.0	1.0	6	23				
SKOUBORD	LIGN	14	51.4 N	161.6 E	18	11	47	50 YD	75	0967.0	1.0							
SEALAND DEFENDER	WGJB	14	38.9 N	151.1 W	21	18	M 45	200 YD	65	0979.0	11.0	12.0	5	8	10	10	10	
	A8XN	15	42.2 N	162.6 E	00	25	M 55	2 NM	36	0999.2	3.8	7.0	8	19.5	24	14	21	
	ELHK	15	37.0 N	154.6 W	00	35	M 60	< 50 YD	21		7.0	9.0	9	41	34	8	24.5	
QUATSINO SOUND	ELAW3	15	40.5 N	162.6 E	00	26	M 52	5 NM	03	0998.0	4.5		12	29.5				
EASTERN VENTURE	JGWT	15	45.9 N	170.8 E	00	20	M 34	5 NM	02	0989.5	5.0	3.0	10	32.5	22	12	39	
ARCTIC TOKYO	SLJT	15	43.2 N	152.5 E	06	28	M 48	.5 NM	70	1011.0	- 4.0	- 1.0	12	26				
ROSE	6ZCJ	15	36.5 N	148.1 W	06	21	M 62	.25 NM	07	0977.0	9.5	12.5						
TONCI TOPIC	ELHX	15	43.9 N	152.5 E	06	31	60	.5 NM	30	1003.0	- 2.0	1.0	10	16.5				
	H3WP	15	46.4 N	154.1 E	06	29	M 50	.5 NM	83	0988.5	0.0	2.0	9	26				
MISSION SANTA CLARA	WKJO	15	34.2 N	154.3 W	06	27	60	5 NM	81	1002.0	6.7	14.0	5	8	29	8	41	
MANULANI	KNIJ	15	31.8 N	139.1 W	12	17	M 48	5 NM	01	1003.5	18.3	15.6	7	19.5				
SKOUBORD	LIGN	15	48.5 N	156.6 E	18	28	45	.25 NM	65	0985.0	2.5							
	BLMK	16	36.5 N	144.4 W	00	29	M 50	.25 NM	21	0993.0	10.0	9.5	10	49	30	10	24.5	
EASTERN VENTURE	JGWT	16	48.5 N	178.2 E	00	23	M 26	5 NM	03	0996.5	2.0	2.5	7	26	22	10	32.5	
MANULANI	KNIJ	16	29.8 N	142.3 W	00	27	M 42	5 NM	02	1009.0	16.7	17.8	10	28	27	17	32.5	
ROSE	6ZCJ	16	36.7 N	143.7 W	06	29	M 45	.25 NM	62	0989.3	9.0	12.5						
	ATIR	16	47.3 N	133.3 W	06	10	M 48	1 NM	65	0998.0	8.0							
	DZSG	16	35.0 N	139.6 W	06	27	49			1001.0	12.0		10	21	27	12	23	
QUATSINO SOUND	ELAW3	16	41.5 N	171.5 E	06	27	M 44	5 NM	26	1004.5	3.5		12	29.5				
MISSION SANTA CLARA	WKJO	16	37.0 N	153.5 W	06	33	45	5 NM	01	1017.2	9.0	13.8	6	18	33	7	32.5	
	3FYJ	16	36.6 N	139.5 W	12	27	M 44			0998.0	10.0		10	36	24	10	41	
EASTERN PACIFIC	H9YW	16	49.3 N	159.8 E	18	29	M 47	2 NM	69	0988.0	- 2.0	- 2.0	12	23				
	RMDM	16	46.7 N	159.2 E	18	28	M 49	1 NM	86	0999.8	- 1.2							
SKOUBORD	LIGN	16	46.0 N	153.4 E	18	27	49	.5 NM	88	1015.0	- 8.0							
	DZSG	17	33.1 N	139.7 W	00	29	47			1014.0	15.5		8	13	29	10	16	
EASTERN VENTURE	JGWT	17	49.0 N	173.6 W	00	27	M 32	5 NM	01	0998.5	1.0	2.5	6	24.5	27	8	31	
	3FYJ	17	35.7 N	141.9 W	05	29	M 37	5 NM	03	1013.5	10.5	15.0	10	36	30	15	41	
MAIN EXPRESS	3EED	17	39.9 N	157.2 W	06	21	M 27	5 NM	02	1019.5	10.0		7	18	07	23	36	
ARCTIC TOKYO	SLJT	17	34.8 N	140.0 E	18	24	M 48	10 NM	00	1003.0	8.0	12.0						
	RMDM	17	43.1 N	151.8 E	18	09	M 51	200 YD	47		1.1							
BARBER TENNESSEE	LFEI	17	37.0 N	150.4 E	18	24	M 45	5 NM	02	0986.0	12.0		8	13				
SKOUBORD	LIGN	17	42.6 N	149.3 E	18	08	48	.25 NM	88	0974.0	1.0	2.0	8	16.5	09	15	10	
	WGJF	17	41.3 N	148.7 E	21	22	M 40	1 NM	26	0965.0	4.0	5.0	10	32.5	22	10	32.5	
SAMUEL S	SLWX	18	42.7 N	164.0 E	00	11	M 45	.25 NM	97	0997.5	1.0	5.0	6	14.5	33	10	13	
GALLEON TOURMALINE	DZJG	18	45.7 N	151.8 E	00	06	M 62	200 YD	88	0983.5	- 2.0	2.0	6	8	06	9	13	
	WGJF	18	41.3 N	148.7 E	00	24	M 65	.25 NM	26		4.0	8.0	9	34.5	24	10	39	
EASTERN PACIFIC	H9YW	18	48.1 N	153.8 E	06	06	M 60	200 YD	07	0973.0	2.0	- 2.0	12	23				
SKOUBORD	LIGN	18	41.4 N	148.0 E	06	32	45	.5 NM	84	0979.0	3.0	3.0	7	19.5	27	10	10	
PRESIDENT GRANT	WEZD	18	35.7 N	144.7 E	10	31	M 50	5 NM	02	1003.2	6.4	10.6	10	29.5	31	10	19.5	
EASTERN VENTURE	JGWT	18	48.9 N	159.8 W	18	36	M 22			1004.0	3.0	4.5	8	29.5	02	10	32.5	
BARBER TENNESSEE	LFEI	18	38.6 N	157.9 E	18	27	M 50			0990.5	9.0							
	3FYJ	19	34.4 N	151.4 W	02	29	M 45	5 NM	01	1013.0	13.0	15.5	8	19.5	28	11	19.5	
BARBER TENNESSEE	LFEI	19	38.6 N	165.1 E	18	29	M 50	2 NM	99	0999.5	6.0		13	32.5				
BARBER TENNESSEE	LFEI	20	38.3 N	166.7 E	00	32	M 50	2 NM	99	1004.5	9.0	10.0	14	36				
PRESIDENT GRANT	WEZD	20	39.8 N	160.0 E	00	31	M 43	5 NM	26	1009.8	4.4	9.4	8	18	31	10	29.5	
PRINCE WILLIAM SOUND	WSDX	21	32.0 N	117.5 W	12	26	M 50	2 NM	81	1011.0	14.0	17.2						
	ATJV	23	39.0 N	171.7 E	00	32	45			0996.2	10.0		6	14.5	32	6	14.5	
SEALAND PATRIOT	KHPF	25	36.8 N	167.6 E	06	16	M 45			1001.8	13.0	11.0	5	10	19	15	14.5	
ALEUTIAN DEVELOPER	WIPL	25	57.0 N	152.9 W	06	10	45	10 NM	02	0995.8	3.3	3.3	5	10	11	7	16.5	
CALIFORNIA RAINBOW	JNJL	26	49.8 N	163.3 E	09	09	M 45	.5 NM	61	0984.0	2.0	3.0	5	10	08	9	19.5	
MING MOON	BLMO	26	31.5 N	176.6 W	17	21	M 47			1010.5	18.5	16.0						
PHILADELPHIA	WJGO	26	56.1 N	148.7 W	18	12	M 45	5 NM	01	0985.0	6.1	5.6	5	13	17	6	32.5	
	BLHZ	27	36.4 N	179.0 E	18	27	M 48	2 NM	54	1000.9	9.8	13.0						
DRAGOR MAERSK	OVYZ	27	36.4 N	174.3 E	18	27	50	10 NM	01	1004.0	9.1		30	32.5				
	BLHZ	28	36.0 N	176.4 W	04	27	M 47	5 NM			11.0	14.0						
KOREAN JUPITER	D7XR	28	36.6 N	171.7 E	06	30	50	5 NM	25	1017.5	9.2	17.0	4	3	32	14	32.5	
DRAGOR MAERSK	OVYZ	28	36.3 N	178.8 E	06	29	50	10 NM	01	1009.0	12.5		30	32.5				
CHUEN ON	H3GX	29	49.5 N	161.0 E	00	07	M 47	5 NM	02	1012.5	2.0	4.0	7	5	25	9	5	
MOBIL ARCTIC	KSPY	29	13.9 N	94.9 W	12	36	45	5 NM		1009.7	26.0	28.3	5	8				
MOBILE MERIDIAN	KGSM	29	58.8 N	138.2 W	18	14	M 46	2 NM	07	0985.1	7.5	5.6	4	6.5	14	7	19.5	
	KGJF	30	51.6 N	141.2 W	23	19	M 47	2 NM	58	0986.0	6.5	7.0	6	10	28	10	23	
ENNA G	C2D6	31	39.7 N	154.6 W	12	30	55	5 NM	60	0998.0	8.0	6.0	9	16.5	30	10	19.5	

\+ Direction of sea waves same as wind
X Direction or period of waves indeterminate
M Measured wind

NOTE: The observations are selected from those with winds ≥ 40 kn or waves ≥ 20 ft from April through September and 45 kn or 30 ft October through March.

U.S. Cooperative Ship Weather Reports

January, February and March 1983

TOTAL WEATHER REPORTS RECEIVED FROM US COOPERATIVE OBSERVING SHIPS JANUARY-MARCH 1983

SHIP NAME	VIA RADIO	VIA MAIL
ACACIA WLB406	2	
ADRIAN MAERSK	37	96
ALBATROSS IV	18	42
ALLTRANS ENTERPRISE	27	137
AMELIA TOPIC	31	143
AMERICAN ALLIANCE	18	53
AMERICAN ARGOSY	26	58
AMERICAN HIGHWAY	41	
AMERICAN LEADER	45	162
AMERICAN LIBERTY	28	155
AMERICAN TRADER	46	158
ANNA MAERSK	24	58
ARCO ANCHORAGE	41	80
ARCO SAG RIVER	49	115
ARILD MAERSK	8	17
ASIA HONESTY	8	
ATIGUN PASS	56	216
AUSTRAL ENVOY	43	99
B T ALASKA	52	231
BALTIMORE TRADER	51	192
BARBER TAIF	27	
BARBER TONSBERG	39	
BAY BRIDGE	14	90
BERNINA		75
BOGASARI TIGA	47	
BOUTWELL WHEC 719	1	59
BUNGA CHEMPAKA	6	
CAPRICORN	37	213
CHARLOTTE MAERSK	94	
CHEROKEE WHEC 165		66
CHEVRON BURNABY	16	
CHEVRON HAWAII	9	26
CHEVRON WASHINGTON	6	
CLARA MAERSK	6	63
COLUMBUS AMERICA	47	
COUNCIL GROVE	3	
CRYSTAL STAR	49	
DAFFODIL	31	162
DAVID PACKARD		22
DEL VALLE	11	17
DELTA CARIBE	27	67
DISCOVERER 055	130	163
DUANE	77	96
EASTERN PACIFIC	21	32
EDWARD RUTLEDGE	35	31
ESSO EVERETT	5	
EVER VALUE	2	
EXPORT FREEDOM	40	186
EXXON BATON ROUGE		9
EXXON HUNTINGTON	13	44
EXXON NEWARK	16	40
EXXON WASHINGTON	21	23
FRANCIS SINCERE NO 6	33	
GALLEON TOURMALINE	23	36
GENISTA	18	
GLOBAL FRONTIER	27	157
GOLDEN DAISY		20
GREEN AUKLET	60	
GUADALUPE I	7	29
HARBOUR BRIDGE	27	20
HIKAWA MARU	51	31
HOEGH MARLIN	14	11
HOEGH TRIGGER	6	57
HOTAKA MARU	85	50
INACHUS STAR	82	
J LOUIS	59	158
JALAMOKAMBI	2	
JEAN LYKES	18	
KAUAI	73	182
KEYSTONER	92	243
KOREAN FIR	10	3
L.W. FUNKHOUSER	3	37
LASH ITALIA	10	56
LESLIE LYKES	25	
LOUISE LYKES	50	
MAIN EXPRESS	69	188
MANULANI	35	155
MARIA TOPIC	42	54
MARJORIE LYKES	12	
MAUMEE	39	
MELVILLE	83	109
MIDGETT WHEC 726	2	
MING MOON	5	21
MOBIL AERO	8	24
MOBILFUEL	13	90
MORMACDRACO	17	66
MORMACSKY	9	
MT MITCHELL	34	99
NAVASOTA	25	
NORDWIND	2	
NORTHWIND WAGB 282	42	85
OCEAN LOG	7	
OGDEN WABASH	1	
ORIENTAL EXECUTIVE	83	79
ORIENTAL TAID	34	70
OVERSEAS JUNEAU	29	56
OVERSEAS VIVIAN	16	
PACEMPEROR	21	
PACIFIC SAGA	11	
PACMERCHANT	7	9
PAN DYNASTY	4	
PARALLA	29	36
PIONEER CONTRACTOR	1	
POLAR STAR WAGB-10	53	94
PRESIDENT ADAMS	36	90
PRESIDENT HOOVER	18	
PRESIDENT KENNEDY	51	81
PRESIDENT ROOSEVELT	38	92
PRESIDENT TYLER	25	55
PRINCE WILLIAM SOUND	69	181
PUNTA MALVINAS	17	40
RALPH B JOHNSON	2	
RICHARD	23	125
ROSE	5	100
ROYAL VIKING SEA	21	
ACADIA	14	65
AFRICAN DAWN	28	104
ALBERT MAERSK	24	25
ALLTRANS EXPRESS	19	88
AMERICA SUN	50	137
AMERICAN APOLLO	49	133
AMERICAN ASTRONAUT	42	91
AMERICAN INDEPENDENCE	40	24
AMERICAN LEGACY	65	137
AMERICAN LYNX	26	179
AMERICANA	26	117
ANNIE JOHNSON	6	35
ARCO CALIFORNIA	40	25
ARCTIC TOKYO		302
ASHLEY LYKES	9	
ASIA INDUSTRY	26	
ATLANTIC PIONEER	48	91
AUSTRAL PIONEER	46	82
B T SAN DIEGO	68	260
BARBER MENESTHEUS	1	
BARBER TENNESSEE	47	76
BARBER TSU	15	30
BAYAMON	35	111
BIBB WHEC 31	2	
BOHEME	21	42
BRINTON LYKES	1	
BUNGA MELAWIS	107	
CHALLENGER		73
CHASE WHEC 718		7
CHERRY VALLEY	28	
CHEVRON CALIFORNIA	52	31
CHEVRON LONDON		125
CHRISTIAN MAERSK	12	75
CLIFFORD MAERSK	66	195
COLUMBUS LOUISANA	73	
COURAGEOUS WHEC 622	17	44
CYGNUS	50	179
DALLAS WHEC 716	16	30
DAVID STARR JORDAN	45	154
DEL VIENTO	8	33
DELTA SUD	29	85
DOCTOR LYKES	33	132
DURABLE	16	
EASTERN VENTURE	13	19
ENNA G	67	138
ESSO NASSAU	31	
EXPORT CHALLENGER	12	60
EXPORT PATRIOT	18	71
EXXON BOSTON	58	136
EXXON JAMESTOWN	15	26
EXXON NORTH SLOPE	8	17
FALSTRIA	31	116
FREDERICK LYKES	31	
GALVESTON	48	129
GEORGE M KELLER	56	
GLOMAR CHALLENGER	87	163
GOLDEN RAY	8	
GREEN FOREST	23	25
H J HAYNES		169
HARDANGER	3	
HILLYER BROWN	4	20
HOEGH MERCHANT	4	70
HOMSING ARROW	2	148
HOWARD W BELL	12	66
INGER	4	97
J R GREY		175
JAPAN ACE	151	83
JOHN LYKES	15	
KEIYO	10	55
KNORR	61	161
KOREAN JUPITER	17	36
LAKE CHARLES	49	174
LASH PACIFICO	8	32
LILLOOET	74	82
LURLINE	39	36
MALLORY LYKES	33	54
MARCONA CONVEYOR		84
MARIA U	1	
MASON LYKES	40	59
MAYA PIONEER		41
MELVIN H. BAKER	107	
MILLER FREEMAN	132	194
MING SPRING	1	
MOBIL ARCTIC	68	270
MOBILGAS	20	64
MORMACLYNX	12	36
MORMACSTAR	49	188
MUNRO WHEC 724	23	
NEPTUNE CRYSTAL	74	
NORDIC PRINCE	18	
NORWAY	24	
OCEANIC	97	168
OLEANDER	34	77
ORIENTAL KNIGHT	41	91
OVERSEAS ARCTIC	54	188
OVERSEAS MARILYN	14	69
PACBARON	17	11
PACGLORY	30	
PACIFIC VENTURE	93	154
PACMONARCH	41	32
PAN PACIFIC	1	
PASSUMPSIC A0-107		28
PLANETREE WLB 307	54	
POLYNESIA	118	186
PRESIDENT CLEVELAND	41	29
PRESIDENT JACKSON	58	83
PRESIDENT MADISON	51	104
PRESIDENT TAFT	55	132
PRESIDENT VAN BUREN	1	40
PROVINCIA DE EL ORO	9	24
QUATSINO SOUND		224
RELIANCE WHEC 615		9
ROBERT D CONRAD		28
ROSE CITY		3
ROYAL VIKING SKY	73	71
ACONCAGUA	3	
AGUADILLA	71	221
ALERT	23	
ALMERIA LYKES	67	
AMERICAN ACCORD	53	170
AMERICAN AQUARIUS	56	164
AMERICAN EXPLORER	14	31
AMERICAN LANCER	32	107
AMERICAN LEGEND	5	43
AMERICAN MARKETER	74	216
AMOCO CAIRO	13	
AQUARIUS	44	163
ARCO FAIRBANKS	59	77
ARECIBO	70	176
ASIA BRAVERY	1	176
ASIA MORALITY	17	
ATLANTIC RAINBOW	14	
AUSTRAL PURITAN	3	
BALD BUTTE	18	129
BARBER NARA	1	
BARBER TERRIER	7	46
BARRANCA	43	106
BAYANO	73	204
BLUE OCEAN	25	134
BORINQUEN	47	133
BROOKS RANGE	14	55
CALIFORNIA RAINBOW	78	261
CHARLES LYKES	41	88
CHASTINE MAERSK	5	17
CHEVRON ANTWERP	6	34
CHEVRON COLORADO	24	36
CHEVRON LOUISIANA	1	
CHUEN ON	40	151
CLOVER	4	10
CONCORDIA SUN	4	30
COVADONGA	17	176
D L BOWER		77
DANA AMERICA	1	
DE STEIGUER T-AGOR12	7	14
DELAWARE II	67	136
DEPENDABLE WHEC 626	2	
DOLLY TURMAN	8	74
EASTERN DIAMOND	4	149
EASTERN WORLD	2	59
ESSO BANGKOK	1	
ESSO PALM BEACH	11	164
EXPORT CHAMPION	16	64
EXXON BALTIMORE	22	56
EXXON CHESTER	10	29
EXXON LEXINGTON	49	57
EXXON PHILADELPHIA	30	60
FIREBUSH WLR 393	4	
FRIENDSHIP	140	
GARDENIA	67	27
GLACIER WAGB 4	141	90
GOLDEN BEAR	36	41
GREAT LAND	56	90
GREEN KOBE	13	16
HAMILTON WHEC 715	15	22
HELLESPONT GLORY	19	71
HOEGH CAIRN	29	59
HOEGH MERIT	6	
HOMSING BREEZE	39	61
HOWELL LYKES	38	
IRONWOOD WLR 297	21	
JACKSONVILLE	8	
JAPAN AMBROSE	24	21
JOSEPH LYKES	1	
KENAI	8	76
KOFUKU MARU	37	166
KOREAN LEADER		18
LAKE TANOE	9	
LAUREL WLB290I	25	
LNG LOUISIANA	38	154
M P GRACE	3	
MANISTEE	23	
MARCONA EXPORTER	33	227
MARINE CHEMICAL TRANSP	14	
MATHILDE MAERSK	1	
MAYAGUEZ	58	121
MEONIA	61	216
MING GALAXY	3	23
MING STAR	35	66
MOBIL LUBE	12	55
MORMACALTAIR	29	90
MORMACSAGA	13	40
MORMACVEGA	13	4
NAGARA	58	50
NEW JERSEY SUN	16	78
NORDIC PILOT	32	
NURA DEL MAR	4	
OCTA	38	161
OLGA TOPIC	24	
ORIENTAL MINISTER	3	13
OVERSEAS CHICAGO	25	94
OVERSEAS NATALIE		12
PACBARONESS	33	
PACIFIC ARROW	134	133
PACLADY	18	
PACNOBLE	36	31
PAN WESTERN	3	
PEIRCE	27	
POLAR ALASKA		238
PONCE	1	
PRESIDENT FILLMORE	54	138
PRESIDENT JEFFERSON	87	193
PRESIDENT MC KINLEY	46	260
PRESIDENT TAYLOR	34	87
PRESIDENT WILSON	35	97
PUEBLA	12	
QUINTINA	36	38
RESEARCHER	48	13
ROBERT E LEE	17	22
ROSINA TOPIC		4
ROYAL VIKING STAR	10	
ADM WM M CALLAGHAN	37	165
ALASKA STANDARD	24	62
ALEUTIAN DEVELOPER	7	110
AMARANTE	29	29
AMERICAN ACE	54	161
AMERICAN ARCHER	82	67
AMERICAN HERITAGE	10	
AMERICAN LARK	57	87
AMERICAN LEGION	60	176
AMERICAN MERCHANT	78	215
ANJA LEONHARDT	54	
ARCO ALASKA	19	22
ARCO PRUDHOE BAY	59	85
ARGONAUT	23	81
ASIA MERON	29	63
ASIAN EXPRESS	50	
AUSTRAL ENTENTE	9	
AXEL MAERSK	22	46
BALTIMORE	21	46
BARBER PRIAM	63	91
BARBER TOBA	22	56
BASSWOOD WLB388	11	
BELO MUNDO	1	
BOGASARI DUA	33	55
BOSTON	19	65
BUILDER	2	44
CANAL ACE	8	41
CHARLESTON	37	5
CHEMICAL VENTURE	20	
CHEVRON ARIZONA	3	62
CHEVRON FELUY	6	5
CHEVRON MISSISSIPPI	75	193
CITRUS WLB300	5	
COLUMBIA	20	
CORNUCOPIA	20	141
CRYSTAL REED	21	
DA HOSTO	9	25
DAVID D. IRWIN	6	24
DEFIANCE		20
DELTA BRASIL	4	
DIANA	11	55
DRAGOR MAERSK	19	92
EASTERN FRIENDSHIP	79	161
EDGAR M QUEENY	6	7
ESSO BAYONNE		58
EVER SPRING	22	17
EXPORT COMMERCE		32
EXXON BANGOR	32	92
EXXON HOUSTON	44	26
EXXON NEW ORLEANS	27	31
EXXON SAN FRANCISCO	11	14
FORTALEZA	33	145
GALLEON AQUAMARINE		1
GENEVIEVE LYKES	12	53
GLACIER BAY	50	71
GOLDEN CLOVER	27	44
GREAT OCEAN	44	99
GREEN STAR	29	43
HANJIN POHANG	2	2
HESS VOYAGER	37	90
HOEGH CLIPPER	13	47
HOEGH MIRANDA	6	63
HONGKONG MARINER	1	
HUDSON T-AO 184	6	
ITALICA	30	101
JADRAN	6	
JAPAN APOLLO	86	100
KANE T-AGS 27	5	11
KENNETH E HILL	48	118
KOREAN COMMANDER	29	26
KOREAN PRIDE	14	7
LASH ATLANTICO	12	78
LAVAUX	56	
LONG LINES	50	24
MAHARSHI KARVE	1	
MANUKAI	49	194
MARDI GRAS	2	4
MARITIME ACE	54	
MAUI	60	223
MAYON	4	
METEOR T-AKR 9	30	
MING GLORY	13	21
MISSION SANTA CLARA	42	179
MOBILE MERIDIAN	61	180
MORMACARGO	32	114
MORMACSEA	8	
MORMACWAVE	5	20
NANCY LYKES	16	
NEWARK	57	156
NORTHERN LIGHT	38	38
OAKLAND	23	108
OGDEN THAMES	8	32
ORCO TRADER	72	80
ORIENTAL SOVEREIGN	45	
OVERSEAS JOYCE	23	
OVERSEAS OHIO	38	22
PACDUCHESS	3	
PACIFIC ERA	14	
PACMAJESTY	6	
PACSTAR	25	9
PANAMA	2	20
PHILADELPHIA	24	116
POLAR SEA	67	
PORTLAND	43	104
PRESIDENT GRANT	41	106
PRESIDENT JOHNSON	62	136
PRESIDENT PIERCE	32	78
PRESIDENT TRUMAN	32	52
PRINCE OF TOKYO	40	
PUNTA BRAVA	14	24
RAINIER	4	
RESOLUTE	47	148
RODRIGUES CABRILHO	16	
ROYAL LYNX	23	
RUTH LYKES	21	

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U.S. NDBC Climatological Data

January, February and March 1983

MARCH 1983 — TOTAL FREQUENCY OF WIND SPEEDS (%) — TOTAL FREQUENCY OF WIND DIRECTIONS (%)

BUOY	LAT	LONG	CALM	<4KT	4-10KT	11-21KT	22-33KT	34-47KT	>47KT	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W		1.1	10.2	40.7	37.5	10.0	0.5	7.0	2.6	7.4	8.6	17.9	18.3	17.6	20.4
41002	32.3N	075.3W		2.8	22.4	58.2	16.4	0.1		5.7	2.7	5.7	12.0	20.4	15.2	19.5	17.8
41006	29.3N	077.3W		4.8	27.5	56.1	11.6			6.8	3.5	6.3	19.8	20.1	9.1	20.7	13.5
42001	25.9N	089.7W		5.2	24.4	43.6	25.8	1.1		16.3	8.0	10.6	19.8	9.9	2.9	13.7	18.8
42002	26.0N	093.5W		8.5	27.1	49.6	17.3	0.7		15.3	12.7	11.1	27.7	12.1	4.1	6.7	12.3
42003	26.0N	085.9W	0.8	2.4	22.0	53.3	22.4			11.6	7.6	11.2	16.1	8.8	8.1	11.7	22.9
42007	30.1N	088.0W		5.3	36.3	51.9	6.4			14.5	6.8	8.0	14.6	11.4	14.5	11.7	18.5
42008	28.7N	095.3W		3.9	41.1	47.9	7.1			12.8	6.0	20.7	20.4	11.8	10.5	3.1	12.8
42009	29.3N	087.5W		4.0	31.1	52.9	11.9			13.5	7.7	10.2	18.2	4.8	5.8	16.8	23.5
42011	29.6N	093.5W	0.8	2.5	38.5	49.4	8.8	0.7		11.5	5.7	14.1	20.7	11.4	13.9	9.1	15.5
44003	40.8N	068.5W		4.2	23.3	49.1	23.0	0.4		4.6	9.5	21.6	9.5	8.1	9.8	16.7	18.3
44004	39.0N	070.0W		3.4	20.9	50.9	23.5	1.2		8.3	7.2	17.9	11.5	8.3	3.9	10.3	28.5
44005	42.7N	068.3W		2.5	13.0	41.9	39.9	2.7		10.6	12.9	34.5	7.9	4.7	5.3	9.6	14.5
44007	43.5N	070.1W		3.7	29.3	63.4	3.5			20.3	14.5	15.1	6.2	5.7	6.3	13.3	16.5
44008	40.5N	069.4W		2.6	19.8	56.7	20.5	0.4		7.0	11.3	20.7	10.2	8.2	6.6	10.1	19.8
45002	45.3N	086.3W		2.0	53.1	44.9					1.0	14.8	14.9	39.3			
45003	45.3N	082.8W		5.9	94.1							16.9	30.1	52.9			
45007	42.7N	087.1W		0.4	32.5	61.7	5.5			31.1	20.8	21.6	21.7	1.1			3.6
45008	44.3N	082.4W		4.7	43.1	42.8	7.5			21.0	28.3	28.6	6.9	3.5	0.3		19.5
46001	56.3N	148.0W		3.8	30.7	63.8	1.8			1.8	9.2	34.1	29.5	11.1	8.2	4.6	1.5
46002	42.5N	130.3W		2.9	17.9	61.1	18.1			9.8	3.2	5.3	10.2	23.8	27.4	15.0	4.5
46003	51.9N	155.7W		0.9	15.6	40.6	22.6	0.3		9.2	20.6	17.9	14.2	14.4	4.2	5.8	13.8
46004	50.9N	135.9W		1.8	23.9	54.0	19.2	1.2		7.0	6.3	20.7	18.0	22.6	14.7	7.0	3.6
46005	46.1N	131.0W		2.0	17.4	56.9	22.6	1.1		8.6	6.3	8.2	14.7	21.4	21.4	13.7	5.7
46006	40.8N	137.6W		0.4	4.7	37.9	54.4	2.6		6.0	3.2	8.3	3.0	15.3	33.8	31.1	7.4
46010	46.2N	124.5W		1.8	28.9	58.3	9.0			3.6	4.8	19.2	11.9	29.9	22.2	4.1	4.2
46012	37.4N	122.7W		7.5	41.1	42.1	9.3			3.6	8.5	1.8	15.9	35.1	9.9	10.8	23.9
46014	39.2N	124.0W		8.8	27.7	42.1	21.5			4.4	1.2	4.1	13.9	37.8	8.6	12.9	17.1
46016	63.3N	170.5W			1.8	40.4	57.9			1.3	96.9	1.8					
46017	60.3N	172.3W			7.0	91.2	1.8				91.1	18.9					
46019	57.2N	170.3W		0.4	15.0	44.3	18.3			9.8	38.9	27.1	20.3	5.3	2.6		
46020	55.9N	160.0W			12.2	48.6	19.2			16.8	34.8	26.5	13.6	2.2	1.3		2.7
46022	40.8N	124.5W		4.4	25.6	41.8	24.1	2.2		5.9	2.1	2.6	23.1	37.5	11.7	4.9	10.1
46023	34.3N	120.7W		5.3	19.5	46.0	9.2			9.6	8.6	2.8	4.0	6.0	3.5	13.3	59.2
46024	32.8N	119.5W		1.2	16.3	48.8	15.7			1.3			8.4	7.8	7.8	21.7	61.9
46025	33.6N	119.0W		4.1	39.4	48.6	5.0			3.5	1.0	0.2	1.2	9.3	6.2	42.1	36.5
46026	37.8N	122.7W		6.7	36.8	49.7	6.7			1.3	2.1	2.4	11.4	37.6	8.7	14.5	22.0
CSBF1	29.7N	085.4W	1.5	19.5	54.4	25.1	0.9			9.9	6.7	16.3	12.0	7.4	7.4	20.3	20.1

MARCH 1983 — % FREQUENCY OF WIND SPEEDS (<4 KTS) — % FREQUENCY OF WIND SPEEDS (4-10 KTS) — % FREQUENCY OF WIND SPEEDS (11-21 KTS)

BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W	0.3	<.05				0.1	0.1	0.4	1.4	1.4	1.3	1.0	0.4	1.3	1.3	1.6	2.8	0.7	1.8	1.7	0.1	0.8	0.5	1.4
41002	32.3N	075.3W	0.1	0.2	0.4	0.3		0.1	0.7	0.7	3.4	2.1	2.5	3.4	3.0	2.5	2.2	2.2	2.8	0.4	1.7	0.5	1.6	4.1	9.1	4.0
41006	29.3N	077.3W	1.1	0.6	0.2	0.4	0.4	0.1	1.4	0.6	4.0	2.8	3.0	4.6	2.7	1.3	3.3	5.0	1.6	0.2	1.5	2.1	3.6	3.5	3.3	1.7
42001	25.9N	089.7W	0.5	0.5	0.7	0.6	1.1	0.3	0.7	0.9	6.5	2.4	2.6	3.4	2.1	1.1	2.0	4.3	9.3	4.9	7.0	6.5	3.1	0.9	3.4	8.7
42002	26.0N	093.5W	0.1	0.6	0.6	0.3	1.1	1.0	1.0	0.7	2.3	5.8	3.5	5.4	2.4	2.2	1.8	5.7	10.9	6.3	7.0	12.9	6.1	0.9	1.7	3.6
42003	26.0N	085.9W	0.4		0.4	0.8	0.4			0.4	2.8	4.8	2.8	2.4	0.7	0.9	1.3	4.9	8.3	2.8	8.1	9.7	4.8	1.0	5.9	10.6
42007	30.1N	088.0W	0.1	0.1	0.1	0.4	0.2	1.5	0.3	0.8	2.9	3.2	3.4	4.4	3.4	4.4	3.4	4.5	10.3	3.0	3.4	7.4	3.1	6.5	6.6	11.7
42008	28.7N	095.3W	0.3	0.4	1.3	0.9	0.3	0.3	0.3	0.2	3.4	4.3	12.2	7.8	6.7	2.4	1.4	3.0	7.9	2.0	7.2	11.2	4.7	7.5	1.2	5.3
42009	29.3N	087.5W	0.5	0.8	0.6	0.3	0.1	0.1	1.0	0.2	3.1	3.7	4.1	4.1	2.8	3.7	5.0	4.5	6.9	1.7	3.7	9.5	0.7	1.6	9.8	19.1
42011	29.6N	093.5W	0.4		0.4	0.6	0.8	0.4	0.2		3.0	2.9	5.1	10.7	6.2	5.6	2.3	2.6	6.9	2.4	9.0	7.9	4.6	7.9	2.6	8.2
44003	40.8N	068.5W	0.4	0.3	0.2	0.1	0.7	1.2	0.9	0.4	1.0	2.6	2.9	3.5	4.6	2.8	1.8	2.1	5.1	1.2	2.7	5.5	1.7	3.6	11.0	7.7
44004	39.0N	070.0W	0.5	0.1	0.7	0.2	0.3	0.6	0.4	2.1	1.3	3.1	3.4	2.6	1.9	1.1	2.6	3.8	4.3	2.1	2.6	6.1	3.2	1.1	8.5	11.3
44005	42.7N	068.3W	0.1	0.7	0.5	0.3	0.4	0.1	0.3	<.05	1.1	1.4	3.9	1.6	0.3	1.9	1.5	1.4	4.1	7.2	12.8	2.5	3.8	2.7	4.0	6.8
44007	43.5N	070.1W	0.8	0.2	0.2	0.1	0.3	0.4	0.6	1.0	4.3	3.6	2.9	3.0	3.2	5.9	4.5	2.2	15.2	10.9	11.1	8.2	2.6	2.0	1.9	8.1
44008	40.5N	069.4W	0.4	<.05	0.1	0.3	0.5	0.3	0.4	0.5	1.9	2.8	1.7	2.9	5.2	1.8	1.5	2.6	1.9	0.6	11.3	0.4	0.2	2.5	0.4	10.6
45002	45.3N	086.3W										1.0	11.4	12.5	51.1	3.7										
45003	45.3N	082.8W																								
45007	42.7N	087.1W																								
45008	44.3N	082.4W	0.5	1.3	2.7	0.8	1.1	0.3			7.7	16.4	11.2	8.8	4.8	2.4			1.0	12.8	8.2	5.1	1.3			
46001	56.3N	148.0W	0.2	0.1	0.1	0.6	0.6	1.5	0.5	0.2	1.6	1.5	5.0	5.4	5.8	5.3	4.0	1.3		7.3	12.7	4.6	12.2	6.4	0.8	1.5
46002	42.5N	130.3W	0.2	0.2		0.4	0.7	0.5	0.4		2.0	3.0	3.6	1.4	0.7	0.4	0.7	1.4	4.4	1.0	3.8	6.0	11.3	11.9	9.3	3.8
46003	51.9N	155.7W	0.1	0.1	0.1	0.3	0.5	0.1	0.1		2.0	3.0	3.6	1.6	1.1	0.7	1.1	1.6	7.0	11.0	6.1	7.1	6.0	11.1	3.2	11.4
46004	50.9N	135.9W			0.1	0.3	0.5	0.1	0.5	0.2	1.4	1.3	4.1	3.1	3.8	4.7	3.8	1.6	5.6	4.9	13.0	9.0	11.2	6.6	7.4	2.6
46005	46.1N	131.0W	0.4	0.3	0.4	0.1		0.3	0.2	0.3	1.0	1.1	1.4	3.0	4.3	2.3	2.4	2.8	3.0	2.9	5.6	6.1	11.1	7.1	16.0	9.3
46006	40.8N	137.6W	0.1		0.1	<.05			0.1	0.3	<.05			0.1	0.5	1.2	2.1	0.4	2.6	1.7	0.2	0.9	1.4	13.4	9.1	8.2
46010	46.2N	124.5W	0.1	0.7	0.5	0.4	0.3	0.3	0.1	0.1	0.7	2.9	1.4	3.5	1.2	0.4	2.1	2.1	2.1	1.2	11.3	6.3	16.3	10.3	6.8	1.6
46012	37.4N	122.7W	0.6	0.2	0.3	0.7	2.1	1.8	0.5	1.9	0.3	0.6	4.2	11.2	9.6	7.1	4.8	9.8	1.1			9.0	11.4	5.1	7.9	4.7
46014	39.2N	124.0W	1.0	0.3	0.7	0.3	0.5	1.4	2.6	1.8	2.0	0.8	2.9	3.0	3.5	3.4	5.9	6.2	1.4		0.5	7.0	12.0	5.0	2.9	3.2
46016	63.3N	170.3W										1.8							1.3	37.3	1.8					
46017	60.3N	172.3W										5.7	1.3							17.3	1.7	1.8				
46019	57.2N	170.3W			0.4						2.5	6.1	3.2	1.7	0.7	0.8			5.6	12.3	8.1	10.4	10.5	4.2	1.8	
46020	55.9N	160.0W									2.2	6.4	1.5	2.0					12.2	12.1	4.1	23.0	1.8	4.9	1.6	1.3
46022	40.8N	124.5W	0.5	0.7	1.3	0.6	0.9	0.5	0.7	1.2	4.3	1.1	1.0	6.1	2.5	3.2	2.8	4.6	1.2	0.3	0.2	12.4	11.4	6.6	6.6	2.9
46023	34.3N	120.7W	0.4	0.3	0.5	0.6		0.3	0.1	0.1	1.0	2.9	1.4	3.1	1.4	2.8	2.1	2.1	1.2	1.3	1.3	6.0	11.3	16.3	0.8	1.6
46024	32.8N	119.2W					0.3	0.4	0.4	0.2	0.3															
46025	33.6N	119.0W	0.1	0.2	0.3	0.4	0.3	0.1	0.1	0.1	0.4	0.3	0.4	0.3	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.4	0.2	0.1	0.1	0.1
46026	37.8N	122.7W	0.3	0.4	0.3	0.1	1.1	1.1	0.9	1.1	1.1	1.0	0.7	1.3	1.0	0.3	1.1	0.5	0.4	0.1	0.2	0.1	0.3	0.1	0.2	0.1
CSBF1	29.7N	085.4W	3.6	2.2	3.0	3.9	2.2	0.7	1.0	3.8	6.3	4.3	8.0	5.6	4.0	4.2	8.3	13.7	1	0.2	0.2	2.9	1.3	2.5	11.0	11.7

MARCH 1983 — % FREQUENCY OF WIND SPEEDS (22- 33 KTS) — % FREQUENCY OF WIND SPEEDS (34-47 KTS) — % FREQUENCY OF WIND SPEEDS (>47 KTS)

BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W	0.8	0.4	3.9	3.9	6.5	4.7	7.1	9.2	1.1		0.6	2.1	2.4	0.3	0.6	2.0	0.5							
41002	32.3N	075.3W			1.0	1.0	2.9	1.6	2.4	7.3							0.1									
41006	29.3N	077.3W				0.3	3.4	4.2	2.8	0.9																
42001	25.9N	089.7W		0.3	0.3	0.3	3.7	7.7	7.0	4.4							0.6	0.5								
42002	26.0N	093.5W	1.9	<.05			8.5	2.5	1	0.2	4.2							0.1								
42003	26.0N	085.9W			0.4	5.2	2.9	4.2	4.5	5.2																
42007	30.1N	088.0W	1.1	0.5	0.2	1.8	0.4		0.4	1.9																
42008	28.7N	095.3W	1.2	0.4		0.5	0.1	0.3	0.1	0.4																
42009	29.3N	087.5W	1.0	1.5	1.8	4.3	0.5		0.3	2.1																
42011	29.6N	093.5W	0.9	0.2	1.6	1.5	0.1			0.5	0.2	0.3						0.2								
44003	40.8N	068.5W	2.3	1.0	5.9	0.3	0.9	0.6	3.1	9.0	0.3	0.3														
44004	39.0N	070.0W	1.5	1.0	1.5	1.6	2.3	0.6	3.2	12.1	0.6	0.6														
44005	42.7N	068.3W	5.3	3.6	17.3	5.5	0.1	0.6	3.9	5.5								2.9								
44007	43.5N	070.1W			0.2	0.5	0.4		0.1	2.4																
44008	40.5N	069.4W	2.6	1.7	5.9	0.6		0.1	3.5	6.2	0.2	0.2														
45002	45.3N	086.3W																								
45003	45.3N	082.8W																								
45007	42.7N	087.1W	4.2		0.7				0.5																	
45008	44.3N	082.4W		4.4					3.1																	
46001	56.3N	148.0W		0.3	0.6	0.8																				
46002	42.5N	130.3W	1.1	0.4	0.7	3.8	5.3	5.3	3.1	0.3																
46003	51.9N	155.7W		0.3	1.1	4.2	1.3	1.0	0.7	2.0							0.3									
46004	50.9N	135.9W		1.4	0.5	4.7	5.4	2.1									0.1	0.4	0.2							
46005	46.1N	131.0W	0.2	2.0	0.8	4.4	5.4	2.9	1.8	1.1							1.1									
46006	40.8N	137.6W	3.0	1.4		1.4	7.5	11.8	21	18.7	4.2						0.8	0.9	0.8	0.5	0.2					
46010	46.2N	124.5W			0.2	0.3	1.7	4.4	1.1																	
46012	37.4N	122.7W				2.0	5.6	<.05		1.6																
46014	39.2N	124.0W				3.6	13.8	1.0	1.1	2.0																
46016	63.3N	170.3W		57.9																						
46017	60.3N	172.3W		1.8																						
46019	57.2N	170.3W	1.6	9.0	3.2	4.1	0.4																			
46020	55.9N	160.0W	2.3	9.0	2.0	2.7	0.6			2.6																
46022	40.8N	124.5W			0.1	3.9	17.5	1.4	0.5	0.7							0.2	2.0								
46023	34.3N	120.7W	1.9			0.8	0.9		0.1	5.6																
46024	32.8N	119.2W				0.4	2.1	0.1	0.3	12.6																
46025	33.6N	119.0W				1.0	0.3		1.0	2.3																
46026	37.8N	122.7W				1.0	4.5			1.2																
CSBF1	29.7N	085.4W					<.05	0.9																		

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AIR TEMPERATURE (DEG C)

BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN
41001	34.9N	072.9W	731	31	21.6109	19	08.5112	14	16.21
41002	32.3N	075.3W	741	31	21.7101	05	11.3125	17	18.01
41006	29.3N	077.3W	396	17	23.2121	15	14.9125	21	19.91
42001	25.9N	089.7W	741	31	24.4120	13	16.2111	21	21.61
42002	26.0N	093.5W	744	31	24.3106	19	15.2116	09	20.41
42003	26.0N	085.9W	248	31	26.2105	21	14.2112	00	20.81
42007	30.1N	088.9W	740	31	20.3107	22	02.2111	13	13.81
42008	28.7N	095.3W	743	31	20.3108	02	05.6121	15	15.11
42009	29.3N	087.5W	743	31	21.4105	20	06.3111	10	15.61
42011	29.6N	093.5W	709	31	19.9106	22	04.7111	13	14.81
44003	40.8N	068.5W	734	31	12.0122	03	00.0123	17	05.61
44004	39.0N	070.0W	734	31	14.1121	19	02.8123	15	10.51
44005	42.7N	068.3W	499	23	09.2119	22	00.0123	12	04.71
44007	43.5N	070.1W	624	31	09.5122	05	00.0127	06	03.21
44008	40.5N	069.4W	704	31	12.3122	02	00.0123	20	05.91
45002	45.3N	086.3W	036	02	02.8131	23	00.0130	06	01.51
45003	45.3N	082.8W	019	01	01.7131	23	00.1131	05	00.91
45007	42.7N	087.1W	212	11	05.4118	20	00.0120	21	02.31
45008	44.3N	082.4W	155	10	04.1119	20	00.0119	23	02.11
46001	56.3N	148.0W	742	31	06.1119	03	01.5102	15	04.51
46002	42.5N	130.3W	743	31	12.3108	20	07.9123	14	10.01
46003	51.9N	155.7W	743	31	04.4106	04	01.2117	04	03.31
46004	50.9N	135.9W	744	31	08.4116	20	03.8104	19	06.41
46005	46.1N	131.0W	743	31	10.6108	16	06.1127	13	08.31
46006	40.8N	137.4W	742	31	13.1106	09	08.7118	17	11.01
46010	46.2N	124.2W	740	31	14.1116	23	05.4127	15	10.31
46011	34.9N	120.9W	744	31	15.9101	03	09.5121	13	13.41
46012	37.4N	122.7W	741	31	14.9101	03	09.9118	10	12.71
46013	38.2N	123.3W	049	03	13.5130	23	11.9130	09	12.81
46014	39.2N	124.0W	736	31	15.3108	20	08.8116	15	12.41
46019	57.2N	170.3W	084	18	02.2103	00	00.1105	00	00.91
46020	55.9N	168.0W	174	25	03.8107	00	00.2104	03	02.01
46022	40.8N	124.5W	741	31	15.2108	19	08.2121	03	11.61
46023	34.3N	120.7W	743	31	16.8101	06	11.7125	07	14.21
46024	32.8N	119.2W	740	31	16.7114	00	11.7125	06	14.51
46025	33.6N	119.0W	744	31	17.4109	22	11.7116	23	14.81
46026	37.8N	122.7W	738	31	14.8108	21	09.6121	05	12.51
C58F1	29.7N	085.4W	727	31	22.4106	21	04.9111	16	14.11

SEA TEMPERATURE (DEG C)

OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN
742	31	23.1109	19	19.1116	07	20.71
744	31	22.7105	07	19.0131	12	20.31
396	17	23.7123	20	20.4116	01	22.31
743	31	25.3116	04	21.7126	11	23.01
744	31	25.1108	21	21.7128	10	22.61
248	31	25.7106	06	20.2118	03	24.51
698	30	17.8107	22	12.1103	12	14.91
743	31	17.6131	21	14.1101	12	16.01
744	31	22.3107	21	17.4123	12	18.71
743	31	05.6115	19	04.5104	13	04.91
736	31	17.6131	21	13.6101	15	14.71
516	23	06.1115	19	04.9124	01	05.61
048	03	03.5131	17	02.8130	17	03.11
725	31	06.7115	20	04.8125	19	05.91
049	03	03.1130	18	02.9130	00	03.01
034	02	02.8131	18	02.3130	14	02.71
274	13	06.9116	20	02.9131	23	03.51
368	16	02.5119	07	00.8130	09	01.91
742	31	06.4120	16	04.3103	13	05.21
743	31	11.2118	23	09.7104	16	10.11
744	31	08.1127	01	04.2101	14	06.51
744	31	07.3125	01	04.0105	15	06.51
744	31	10.3119	00	08.7104	09	09.01
744	31	11.0101	01	10.1118	10	10.41
740	31	12.7131	22	09.0104	10	11.61
744	31	16.3113	00	13.5129	08	14.91
741	31	14.9128	22	13.0123	15	13.81
049	03	12.8131	01	12.5130	05	12.61
742	31	15.0116	00	12.5129	09	13.41
245	31	03.5101	21	01.9115	00	02.71
744	31	13.5116	01	11.6129	12	12.31
744	31	15.9107	21	13.3131	22	14.91
742	31	16.1113	21	15.0103	14	15.41
744	31	17.1109	23	14.8127	07	16.01
737	31	15.6115	22	12.0106	13	13.61

AIR-SEA TEMPERATURE DIFFERENCE (DEG C)

OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN
742	31	01.3109	06	-01.3112	14	-04.51
744	31	01.3118	14	-10.2111	12	-02.31
396	17	01.1118	07	-08.1125	09	-02.41
743	31	02.4127	10	-06.5111	21	-01.41
744	31	01.1107	14	-07.4112	09	-02.21
250	31	01.3118	06	-09.5122	09	-03.71
703	30	05.1105	16	-12.1111	13	-01.01
744	31	04.2104	15	-10.5121	13	-00.91
744	31	01.9105	20	-12.8111	16	-03.21
743	31	07.0124	14	-05.1123	17	00.41
736	31	04.3121	22	-12.1123	18	-04.21
516	27	03.2119	22	-05.3105	16	-01.31
048	03	00.6130	22	-02.9131	15	-01.81
725	31	06.2128	16	-05.9123	20	-00.11
049	03	-00.3131	23	-02.9130	06	-01.71
034	02	02.8131	18	02.3130	14	02.71
274	13	06.9116	20	02.9131	23	03.51
368	16	02.5119	07	00.8130	09	01.91
742	31	06.4120	16	04.3103	13	05.21
743	31	11.2118	23	09.7104	16	10.11
744	31	08.1127	01	04.2101	14	06.51
744	31	07.3125	01	04.0105	15	06.51
744	31	10.3119	00	08.7104	09	09.01
744	31	11.0101	01	10.1118	10	10.41
740	31	12.7131	22	09.0104	10	11.61
744	31	16.3113	00	13.5129	08	14.91
741	31	14.9128	22	13.0123	15	13.81
049	03	12.8131	01	12.5130	05	12.61
742	31	15.0116	00	12.5129	09	13.41
245	31	03.5101	21	01.9115	00	02.71
744	31	13.5116	01	11.6129	12	12.31
744	31	15.9107	21	13.3131	22	14.91
742	31	16.1113	21	15.0103	14	15.41
744	31	17.1109	23	14.8127	07	16.01
737	31	15.6115	22	12.0106	13	13.61

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PRESSURE (MB)

BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN
41001	34.9N	072.9W	742	31	1029.9127	01	989.9125	11	1010.81
41002	32.3N	075.3W	743	31	1029.7126	15	992.9125	03	1011.61
41006	29.3N	077.3W	393	17	1026.8126	16	995.6118	10	1011.81
42001	25.9N	089.7W	722	31	1022.4129	16	995.0116	17	1012.51
42002	26.0N	093.5W	744	31	1022.4129	17	995.3116	21	1011.71
42003	26.0N	085.9W	238	30	1022.4129	15	995.8118	00	1012.71
42007	30.1N	088.9W	730	31	1025.8129	16	993.4116	21	1011.91
42008	28.7N	095.3W	740	31	1024.7111	17	996.6104	20	1011.61
42009	29.3N	087.5W	712	30	1025.3129	17	998.9116	19	1012.31
42011	29.6N	093.5W	709	31	1025.5116	17	998.5116	21	1011.81
44003	40.8N	068.5W	743	31	1031.3106	06	970.4113	01	1008.61
44004	39.0N	070.0W	732	31	1029.5127	13	973.5112	07	1008.91
44005	42.7N	068.3W	515	23	1032.0106	06	981.6113	07	1009.31
44007	43.5N	070.1W	743	31	1032.4106	06	987.0113	08	1011.31
44008	40.5N	069.4W	726	31	1031.7107	06	975.2112	21	1008.01
45002	45.3N	086.3W	049	03	1027.3130	12	1013.1131	23	1022.11
45003	45.3N	082.8W	036	02	1018.9131	13	1015.6131	23	1021.91
45007	42.7N	087.1W	274	13	1032.0129	17	999.4127	22	1015.91
45008	44.3N	082.4W	368	16	1033.2129	19	994.2119	17	1015.81
46001	56.3N	148.0W	743	31	1016.8116	12	975.7112	14	997.81
46002	42.5N	130.3W	743	31	1023.4131	20	982.8102	21	1003.21
46003	51.9N	155.7W	744	31	1015.3116	17	974.5112	04	992.51
46004	50.9N	135.9W	744	31	1017.6115	11	978.1108	22	1001.71
46005	46.1N	131.0W	744	31	1020.6121	20	981.0113	13	1001.91
46006	40.8N	137.6W	744	31	1022.3125	04	981.0116	04	1002.71
46010	46.2N	124.2W	743	31	1025.8115	17	987.0113	23	1007.11
46011	34.9N	120.9W	686	30	1023.5130	07	997.4102	19	1015.11
46012	37.4N	122.7W	698	31	1026.0131	19	993.1102	16	1014.61
46013	38.2N	123.3W	049	03	1025.1131	18	1019.8131	03	1022.01
46014	39.2N	124.0W	674	29	1026.9131	18	993.1101	17	1013.81
46016	63.3N	170.3W	248	31	1017.9119	12	999.8129	03	1010.01
46017	60.3N	172.3W	257	08	1006.9131	21	995.8128	03	1000.61
46019	57.2N	170.3W	247	31	1015.8114	21	980.7101	18	999.61
46020	55.9N	168.0W	245	31	1013.3115	09	981.6101	15	996.61
46022	40.8N	124.5W	744	31	1027.0131	19	987.6102	11	1009.61
46023	34.3N	120.7W	700	30	1023.1130	08	997.2102	06	1014.41
46024	32.8N	119.2W	709	30	1023.3131	07	997.4102	19	1014.51
46025	33.6N	119.0W	710	30	1022.9127	19	999.2102	20	1014.51
46026	37.8N	122.7W	700	31	1027.0131	18	993.1103	06	1014.51
C58F1	29.7N	085.4W	719	31	1025.0129	15	994.7117	00	1012.91

WIND SPEEDS (KNOTS)

OBS	MAX	DY HR	DIR
738	55125	12	360
744	34125	06	270
396	30125	00	260
730	38117	09	260
715	38103	21	150
246	33101	03	270
730	29126	21	160
737	33123	19	350
729	33124	06	110
719	41123	22	340
738	34125	16	040
731	38125	16	020
516	39103	14	320
733	28103	16	310
720	36127	16	020
049	15130	09	180
034	08130	22	170
274	24128	09	360
360	28121	10	040
741	39126	14	130
734	26125	14	120
734	33113	11	260
740	36116	07	120
744	40115	11	150
736	32113	20	190
734	33101	02	160
730	33123	21	180
057	33125	09	040
057	29125	09	050
286	28101	15	130
245	31101	06	100
744	38110	05	170
714	28101	07	160
744	29104	19	140
737	28124	09	330
730	33101	01	170
744	29101	02	270

MEAN WIND SPEED (KNOTS)

OBS	E	SE	S	SW	W	NW	TOTAL
738	21.81	25.41	22.51	19.31	20.41	23.21	21.51
744	12.11	14.11	15.41	13.51	16.21	18.81	15.01
396	7.81	6.71	9.81	13.31	16.21	18.71	11.91	13.81
730	11.41	11.31	13.11	19.31	16.61	14.21	20.41	16.01	15.81
715	15.71	19.31	17.51	17.91	13.61	6.81	9.51	14.31	14.33
246	11.11	9.91	13.21	16.41	18.61	20.61	19.81	15.11	15.61
730	14.41	11.41	10.01	13.61	9.71	9.51	11.41	14.21	12.11
737	14.51	10.61	9.71	11.71	10.21	12.71	10.81	17.51	12.21
729	13.01	11.01	13.01	15.21	9.81	8.31	11.91	15.31	13.31
738	14.31	9.41	9.11	9.91	10.71	11.41	17.31	17.31	12.81
735	18.11	14.41	17.31	12.21	10.01	10.61	16.21	19.41	15.51
731	17.71	14.91	13.31	14.91	12.31	15.11	19.41	16.21
516	19.51	18.11	20.51	17.01	12.71	14.01	18.61	23.01	19.31
733	13.41	13.31	13.81	11.61	9.41	8.11	11.91	14.81	12.71
720	17.51	15.21	17.61	13.81	9.01	11.91	16.51	18.01	15.81
049		4.51	6.41	9.41	10.61				09.41
034		7.51	6.61	6.51					06.71
274	11.01	11.71	10.41	10.81			19.51	13.11
360	12.41	12.11	8.41	7.71	4.61	1.01		17.41	11.81
734	4.31	15.71	14.51	13.51	10.31	7.11	5.91	6.11	12.61
734	14.71	11.41	12.91	15.31	15.61	15.61	15.91	15.61	15.41
740	19.51	16.91	14.51	18.81	16.31	15.61	15.91	14.21	16.51
744	22.01	21.11	11.31	25.41	22.81	21.91	22.21	21.81	22.11
736	10.41	8.81	11.91	11.61	16.91	13.91	7.71	9.31	13.31
734	8.81	5.21	7.11	16.51	18.91	11.41	9.41	11.71	10.41
730	14.01	22.91	11.01						15.01
057	24.01	29.01	8.01						15.01
286	28101	15	130	16.91	16.71	16.21	14.71	13.01				16.21
245	31101	06	100	16.61	16.31	16.11	16.81	16.91	15.51		25.31	16.41
744	38110	05	170	7.61	5.71	5.61	15.11	21.71	13.91	11.51	10.51	15.81
714	28101	07	160	15.71	6.01	6.41	14.61	16.11	10.01	9.71	15.31	14.21
744	29104	19	140	25.41	17.91	14.91	12.91	12.41	10.91	12.71	17.41	15.91
737	28124	09	330	5.11	8.01	3.91	15.61	11.31	6.91	11.71	12.01	11.31
730	33101	01	170	5.41	5.71	7.11	12.61	13.81	6.91	10.71	12.81	12.01
744	29101	02	270	4.01	4.71	8.21	7.11	6.41	8.21	11.41	7.01	07.71

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WAVE HEIGHTS (METERS)

BUOY	LAT	LONG	OBS	MAX	DY	HR	MEAN
41001	34.9N	072.9W	734	10.0	25	15	3.2
41002	32.3N	075.3W	738	7.5	25	20	2.8
41006	29.3N	077.3W	391	6.0	25	04	2.5
42001	25.9N	089.7W	726	6.0	17	18	1.8
42002	26.0N	093.5W	744	5.0	17	15	1.6
42003	26.0N	085.9W	244	5.0	24	22	0.9
42007	30.1N	088.9W	544	3.0	24	22	0.9
42009	29.3N	087.5W	721	5.5	27	02	1.6
42011	29.6N	093.5W	709	7.0	03	15	2.9
44003	40.8N	068.5W	741	7.0	03	15	2.9
44004	39.0N	070.0W	708	8.5	25	20	2.9
44005	42.7N	068.3W	465	6.0	03	15	2.3
44007	43.5N	070.1W	687	4.5	20	02	1.5
44008	40.5N	069.4W	683	6.0	24	17	2.5
45002	45.3N	086.3W	043	1.0	30	09	0.8
45003	45.3N	082.8W	027	0.5	31	21	0.5
45007	42.7N	087.1W	100	3.5	19	13	1.7
45008	44.3N	082.4W	319	4.5	21	12	1.4
46001	56.3N	148.0W	741	9.5	27	02	2.7
46002	42.5N	130.3W	742	7.5	16	23	3.8
46003	51.9N	155.7W	742	6.5	07	22	3.2
46004	50.9N	135.9W	744	9.0	26	11	3.1
46005	46.1N	131.0W	743	7.0	16	21	3.3
46006	40.8N	137.6W	737	10.0	16	06	3.5
46010	46.2N	124.2W	743	7.5	13	22	2.8
46011	34.9N	120.9W	743	8.0	01	23	3.1
46012	37.4N	122.7W	741	8.0	01	22	3.2
46013	38.2N	123.3W	049	3.5	31	08	2.8
46014	39.2N	124.0W	737	8.5	24	07	3.2
46023	34.3N	120.7W	736	8.0	02	01	3.2
46024	32.8N	119.2W	731	8.5	02	09	3.1
46025	33.6N	119.0W	737	7.0	02	01	2.3
46026	37.8N	122.7W	708	7.0	01	21	2.7

FREQUENCY OF WAVE HEIGHTS (%)

<1M	1-1.5M	2-2.5M	3-3.5M	4-5.5M	6-7.5M	8-9.5M	39.5M
1.2	20.2	26.0	15.8	30.1	3.9	2.1	0.4
0.2	31.0	25.2	14.6	24.7	4.0		
4.3	27.8	26.0	21.7	18.9	1.0		
11.4	42.8	24.5	14.3	6.6	0.2		
13.5	49.3	21.6	11.4	4.0			
49.4	40.4	9.3	0.5				
22.4	37.0	24.4	12.6	3.4			
5.2	17.6	20.2	25.5	29.1	2.1		
1.8	22.1	26.8	21.6	23.3	3.3	0.8	
13.3	21.5	27.5	22.8	14.8	0.2		
27.8	34.0	23.3	11.6	2.9			
6.2	22.0	24.3	26.6	20.0	0.1		
32.5	47.4						
0.0							
5.0	51.0	29.0	15.0				
33.2	32.6	23.8	7.5	2.8			
	11.5	44.5	26.9	16.5	0.5		
	0.2	11.9	34.0	50.0	3.6		
	3.3	27.3	38.2	30.3	0.6		
	9.9	30.9	27.1	28.4	3.3	0.1	
	4.5	20.3	41.8	31.7	1.4		
		23.8	29.5	32.3	12.2	0.9	0.4
0.1	17.4	31.0	35.5	14.8	1.2		
	3.2	39.5	32.4	21.8	2.8	0.6	
	1.6	35.2	41.5	17.6	3.7	0.1	
		46.9	53.0				
	5.6	26.1	35.8	26.8	1.3		
	1.0	36.0	34.9	24.0	3.8	0.1	
	4.0	38.4	30.5	21.7	2.7	0.5	
	24.8	50.6	16.2	6.9	1.3		
	10.8	46.1	32.2	9.1	1.8		

FEBRUARY 1983			TOTAL FREQUENCY OF WIND SPEEDS (%)							TOTAL FREQUENCY OF WIND DIRECTIONS (%)							
BUOY	LAT	LONG	CALM	<4KT	4-10KT	11-21KT	22-33KT	34-47KT	>47KT	N	NE	E	SE	S	SW	W	NW
41001	34.7N	072.3W		2.5	12.7	31.8	45.8	7.2		17.2	11.8	10.0	8.8	6.9	6.9	16.7	23.6
41002	32.3N	075.3W		3.0	20.0	53.9	23.1			14.3	10.4	9.9	13.6	11.8	9.9	13.8	21.4
41006	29.3N	077.3W		2.8	20.5	58.2	18.5			6.0	7.8	10.8	17.5	13.8	7.1	15.8	22.1
42001	25.9N	089.7W		1.6	21.9	43.6	30.1	2.8		12.4	7.7	11.3	15.9	7.7	5.4	23.7	15.9
42002	26.0N	093.5W		5.1	22.4	53.8	17.8	0.9		22.4	12.2	10.8	10.5	6.0	1.6	5.9	22.7
42003	26.0N	086.0W		1.3	22.0	52.0	24.2	0.4		13.9	12.7	21.1	14.0	3.7	4.0	11.7	18.9
42007	30.1N	088.9W		3.9	30.2	54.8	11.2			14.3	16.4	23.1	10.6	4.0	4.8	14.0	12.9
42008	28.7N	095.3W		2.4	35.2	50.2	12.2			20.1	18.9	13.0	13.4	5.2	6.2	7.7	15.5
42009	29.3N	087.5W		2.1	25.7	52.3	19.2	0.8		12.6	12.3	17.2	18.7	5.4	1.5	15.9	16.3
42011	29.6N	093.5W	0.6	4.6	34.3	51.5	9.7			16.2	23.1	11.5	15.2	6.0	10.8	9.2	8.1
44003	40.8N	068.5W		2.8	19.3	52.2	24.5	1.2		25.4	11.6	7.2	12.9	8.9	5.2	11.0	20.7
44004	39.0N	070.0W		1.2	16.1	48.6	32.8	1.2		24.7	13.3	13.3	10.3	2.7	3.6	11.4	20.7
44005	42.7N	068.3W		2.1	13.9	43.3	35.5	5.2		24.5	18.8	7.5	10.4	6.8	6.7	7.4	18.0
44007	43.5N	070.1W		5.4	31.9	53.4	9.3			26.4	16.6	3.9	8.4	7.3	12.2	6.3	19.0
44008	40.5N	069.4W		3.8	17.4	54.4	23.1	1.4		23.1	16.0	8.0	14.4	4.8	4.4	11.6	18.5
46001	56.0N	148.0W		4.0	31.6	59.5	4.8			5.1	5.4	31.4	13.5	14.0	9.5	10.7	10.4
46002	42.5N	130.0W		4.1	13.1	58.9	23.9			5.6	6.2	7.2	7.1	33.9	22.7	11.5	5.8
46003	52.0N	156.0W		4.0	26.8	48.3	20.9			8.0	10.6	16.2	8.1	7.4	10.5	17.3	5.9
46004	51.0N	136.0W		3.0	18.1	42.7	34.3	1.8		1.9	3.1	7.6	29.1	27.6	19.5	9.3	0.8
46005	46.0N	131.0W		2.5	14.1	53.9	28.3	1.2		5.0	6.5	1.5	12.1	35.3	24.7	12.8	2.1
46006	40.7N	137.7W		1.2	4.8	12.0	51.7	10.3		2.6	2.4	5.7	5.8	24.0	33.4	18.7	7.4
46010	46.2N	124.2W		0.7	13.2	73.8	12.3			1.1	2.8	27.8	10.4	35.6	14.1	7.0	1.2
46012	37.4N	122.7W		16.8	35.3	38.1	9.8			9.9	2.6	1.5	11.5	37.8	10.1	9.0	17.7
46013	38.2N	123.3W		3.1	34.2	56.2	6.5			3.0	1.1	21.1	20.1	21.0	13.6	11.4	6.7
46014	39.2N	124.0W		3.4	22.5	52.1	20.7	1.3		1.0	1.4	6.8	19.2	42.1	13.5	6.4	9.5
46019	57.2N	177.3W		1.8	19.8	43.2	32.9	2.3			21.4	37.4	28.4	7.8	4.3	0.8	
46020	55.9N	168.0W			14.3	40.1	25.6			8.7	19.5	35.7	25.7	5.2	4.1	0.7	0.4
46022	40.8N	124.5W		2.6	20.5	50.5	24.8	1.7		2.4	2.1	3.3	24.3	46.8	11.7	2.6	6.9
46023	34.3N	120.7W		5.3	23.2	43.3	8.2			8.8	8.6	7.7	14.7	7.3	7.2	9.9	43.7
46024	33.0N	119.2W		3.6	37.5	51.6	7.0	0.3		5.0	1.4	2.0	6.6	5.0	10.8	12.1	55.1
46025	37.4N	122.7W		14.7	51.4	30.5	3.4			6.5	5.8	11.4	7.2	6.3	9.3	27.4	26.0
46026	37.8N	122.7W		9.3	34.8	49.9	6.0			2.9	7.9	19.8	8.9	26.3	13.3	9.9	10.9

FEBRUARY 1983			% FREQUENCY OF WIND SPEEDS (<4 KTS)							% FREQUENCY OF WIND SPEEDS (4-10 KTS)							
BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.7N	072.3W	0.3	0.5	0.2	0.3	0.3	0.1	0.5	0.2	2.9	3.6	1.3		0.9	0.8	1.1	2.2
41002	32.3N	075.3W		0.3	0.3	0.4	0.6	0.8			2.3	2.4	2.9	4.1	2.7	0.6	0.9	4.1
41006	29.3N	077.3W	0.3	0.1	0.2	0.3	0.4	1.0	0.2	0.3	2.9	2.9	1.9	4.4	2.4		0.4	5.6
42001	25.9N	089.7W	0.3		0.1	0.1	0.4	0.2	0.3	0.3	1.9	2.2	2.3	1.7	0.3	2.4	7.0	4.1
42002	26.0N	093.5W	1.0	1.5	0.7	0.5	0.3	0.2	0.7	0.3	6.4	4.6	1.6	2.3	0.7	0.7	1.7	4.2
42003	26.0N	086.0W		0.6	0.8						0.3	4.8	3.4	0.4		0.4	3.4	0.2
42007	30.1N	088.9W	0.8	0.5	0.3	0.8	1.0		0.3	0.3	4.4	5.6	5.2	3.1	2.3	2.9	3.4	3.1
42008	28.7N	095.3W	0.4		0.5	0.3	0.3	0.3	0.2	0.4	4.4	6.3	3.3	5.4	3.9	3.8	1.7	6.3
42009	29.3N	087.5W	0.3	0.5	0.8		0.2	<.05	0.1	0.3	6.4	3.3	4.7	2.7	1.6	0.1	1.4	5.4
42011	29.6N	093.5W	0.6	1.2	0.5	0.9	0.6	0.2	0.4	0.2	5.7	4.7	2.8	5.3	4.4	6.5	2.8	2.1
44003	40.8N	068.5W	1.1	0.2		0.1	0.1	0.9		0.3	4.4	2.2	3.7	3.2	2.2	1.5	1.0	1.8
44004	39.0N	070.0W		0.3	0.2			0.2	0.3	0.3	5.7	3.5	3.5	1.0	0.3	0.5	0.8	0.9
44005	42.7N	068.3W	0.9	0.2	0.4			0.3		0.3	2.6	1.9	1.7	2.3	2.0	1.1	0.9	1.4
44007	43.5N	070.1W	0.3	0.4	0.6	1.0	0.8	1.0	0.9	0.4	5.6	6.2	2.4	3.7	2.4	5.2	4.4	2.3
44008	40.5N	069.4W	0.7	0.6	0.6	0.5	0.3	0.7	0.2	0.2	3.8	3.1	1.2	2.3	1.6	2.0	0.9	2.6
46001	56.0N	148.0W	0.6	0.6	0.4	0.4	0.3	0.7	0.4	0.6	4.1	1.4	3.6	5.2	4.3	3.2	4.7	5.0
46002	42.5N	130.0W	0.1		0.5	0.5	1.2	1.0	0.5	0.3	0.8	0.7	0.9	1.8	3.0	3.3	1.9	0.6
46003	52.0N	156.0W	0.7	0.7	0.5	0.7	0.4	0.2	0.4	0.3	0.5	3.4	3.1	2.7	3.2	8.1	4.2	1.5
46004	51.0N	136.0W	0.1	0.4	0.4	0.4	0.1	0.5	0.4	0.4	1.0	0.7	1.5	2.3	5.1	4.6	1.3	1.6
46005	46.0N	131.0W	0.1	0.2	0.3	0.6	0.2	<.05	0.6	0.3	2.5	0.8	0.3	2.3	3.1	1.7	1.9	1.5
46006	40.7N	137.7W	0.1			0.1		0.3	0.5	0.1	1.0			0.3	1.0	0.8	0.3	1.2
46010	46.2N	124.2W	0.1		0.3			0.1		0.1		1.3	3.5	1.7	1.2	2.1	3.2	0.2
46012	37.4N	122.7W	2.7	1.3	0.5	2.1	2.9	7.3	1.5	4.2	6.9	1.3	1.0	3.7	10.4	4.3	0.5	1.8
46013	38.2N	123.3W	0.2	0.9			0.5	0.4	0.7	0.4	2.3	0.1	0.5	8.2	1.3	5.6	2.3	1.0
46014	39.2N	124.0W		0.5	0.6	<.05	0.4	0.9	0.6	0.6	0.7	0.9	3.9	3.9	6.6	2.7	1.8	1.9
46019	57.2N	177.3W				0.9	0.9						6.8	6.4	4.3	2.4		
46020	55.9N	168.0W											3.9	6.6	2.0	1.3		0.4
46022	40.8N	124.5W	0.3	0.7	0.5	0.5	0.1	<.05	0.2	0.3	1.6	1.4	2.4	7.4	1.6	1.5	0.6	3.8
46023	34.3N	120.7W	0.5	0.2	0.3	0.4	0.3	0.5	2.0	0.9	0.5	0.3	2.3	5.8	2.6	3.7	5.3	1.6
46024	33.0N	119.2W	0.5	<.05	0.1	<.05	0.4	0.4		2.2	3.3	1.1	0.8	2.5	3.2	4.6	7.4	14.5
46025	37.4N	122.7W	1.7	1.8	1.8	1.1	1.5	1.3	3.7	1.9	4.0	1.6	6.8	9.4	2.9	4.7	13.0	13.1
46026	37.8N	122.7W	1.1	1.2	2.2	1.0	0.3	0.8	1.5	1.2	1.5	3.0	10.3	2.7	4.4	5.7	2.5	4.7

FEBRUARY 1983			% FREQUENCY OF WIND SPEEDS (22- 33 KTS)							% FREQUENCY OF WIND SPEEDS (34-47 KTS)							% FREQUENCY OF WIND SPEEDS (>47 KTS)						
BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.7N	072.3W	5.5	1.6	3.5	6.1	3.5	3.5	10.7	11.3	1.5		0.9	0.7	0.6	0.9	0.9	1.6								
41002	32.3N	075.3W	0.7		2.1	3.2	4.1	2.8	6.9	3.3																
41006	29.3N	077.3W		1.0	2.6	4.9	2.2	2.2	7.1	1.3																
42001	25.9N	089.7W	2.4	1.5	4.0	7.5	4.2	1.0	6.4	3.3		<.05	0.4	0.3	1.3	<.05	0.6	0.1								
42002	26.0N	093.5W	2.7	0.9	2.8	4.0	2.5	0.2	0.8	4.0		0.2	0.6	0.2												
42003	26.0N	086.0W	1.7	1.3	7.2	5.6	2.6	2.6	2.8	0.4	0.3							0.1								
42007	30.1N	088.9W	1.6	1.8	3.0	0.6	0.2	0.1	2.3	1.6																
42008	28.7N	095.3W	1.9	4.1	2.2	0.2	0.2		1.4	0.7																
42009	29.3N	087.5W		0.5	4.9	0.1	0.3	0.3	4.3	1.1		0.1	0.5					0.2								
42011	29.6N	093.5W	1.7	6.9	0.3	<.05	0.2	<.05	0.2	<.05																
44003	40.8N	068.5W	5.1	4.2	2.1	1.8	0.5	0.6	1.9	8.3	0.9		0.6					0.2								
44004	39.0N	070.0W	9.6	3.8	2.9	3.0	0.9	0.8	5.5	6.9		0.3	0.8					0.3								
44005	42.7N	068.3W	9.4	7.3	1.9	3.2	0.6	0.9	0.9	11.7	0.7	1.9	1.5	0.3	0.3			0.6								
44007	43.5N	070.1W	3.3	1.1		0.6	0.3		0.1	3.9																
44008	40.5N	069.4W	7.9	3.9	2.5	1.5			2.6	5.1	0.6	0.2	0.6													
46001	56.0N	148.0W		0.9	3.9	0.1	0.3																			
46002	42.5N	130.0W		3.2	2.5	1.1	11.2	4.9	1.0																	
46003	52.0N	156.0W	2.9	0.1	2.5	0.9	0.1	1.2	4.7	0.5																
46004	51.0N	136.0W		0.2	5.1	14.6	6.9	2.1	2.8	2.6						0.9						0.7	0.2			
46005	46.0N	131.0W	0.3	2.8	0.6	4.2	11.4	3.7	3.9							<.05		1.2								
46006	40.7N	137.7W		0.4	2.2	2.3	12.7	19.8	11.9	3.3		1.2	2.5	0.9	2.6	1.5	1.9	0.1								
46010	46.2N	124.2W				<.05	11.4	0.9																		
46012	37.4N	122.7W				2.9	5.3	0.2	1.1	0.4																
46013	38.2N	123.3W			1.9	0.7	2.3	0.8	0.8																	
46014	39.2N	124.0W				4.2	11.6	2.4	1.0	1.4				0.3	1.1											
46019	57.2N	177.3W		18.8	10.8	3.3								2.3												
46020	55.9N	168.0W	7.6	8.5	6.5	1.6		0.7	0.7																	
46022	40.8N	124.5W				3.8	18.5	2.2		0.3				0.1	1.5											
46023	34.3N	120.7W	1.7		0.4	1.6	0.1			4.4																
46024	33.0N	119.2W	0.2	0.2	0.2	0.2		0.2	0.2	6.0	0.2	0.2														
46025	37.4N	122.7W	0.2	0.9	0.2				1.0	1.2																
46026	37.8N	122.7W				1.1	3.4	0.5	0.8	0.1																

FEBRUARY 1983

AIR TEMPERATURE (DEG C)

BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN
41001	34.7N	072.3W	662	28	21.1|11	19	06.1|26	12	14.1
41002	32.3N	075.3W	669	28	21.5|03	09	10.8|26	15	16.5
41006	29.3N	077.5W	396	17	23.3|14	04	16.1|09	08	19.3
42001	25.9N	089.7W	669	28	25.3|01	06	16.9|12	23	21.3
42002	26.0N	093.5W	671	28	23.9|01	11	15.6|14	06	19.7
42003	26.0N	086.0W	224	28	25.5|02	03	16.2|13	21	20.2
42007	30.1N	088.9W	668	28	18.4|26	23	05.0|03	14	12.2
42008	28.7N	095.3W	670	28	18.5|09	18	05.7|07	14	12.9
42009	29.3N	087.5W	671	28	22.7|01	22	08.4|07	18	15.5
42011	29.6N	093.5W	506	22	17.8|17	20	06.2|27	14	13.0
44003	40.8N	068.5W	605	27	12.2|03	13	00.0|06	08	04.3
44004	39.0N	070.0W	653	28	17.6|03	08	01.6|10	19	07.8
44005	42.7N	068.3W	482	24	11.3|03	15	00.0|05	08	03.9
44007	43.5N	070.1W	335	21	08.8|03	16	00.0|08	01	02.8
44008	40.5N	069.4W	541	27	13.1|03	13	00.0|06	14	04.8
46011	56.0N	148.0W	672	28	04.9|22	09	00.4|05	17	03.4
46021	42.5N	130.0W	670	28	12.4|22	14	07.4|04	07	10.2
46031	52.0N	156.0W	669	28	04.1|15	20	00.0|21	08	02.5
46034	51.0N	136.0W	669	28	08.0|19	12	02.4|09	02	06.4
46035	46.0N	131.0W	671	28	10.6|11	03	05.3|26	14	08.3
46036	40.7N	137.7W	660	28	16.9|10	16	10.3|23	16	14.3
46041	46.2N	124.2W	669	28	13.7|11	21	05.7|08	16	09.7
46011	34.9N	120.9W	670	28	16.0|22	20	10.3|02	20	13.9
46012	37.4N	122.7W	506	22	14.7|16	23	11.0|08	03	13.2
46013	38.2N	123.3W	357	15	14.5|07	23	10.2|05	12	12.9
46014	39.2N	124.0W	667	28	15.0|28	21	09.6|05	16	12.8
46019	57.2N	170.3W	059	16	01.9|09	15	00.1|02	00	00.7
46020	55.9N	148.0W	181	24	03.8|27	00	00.3|01	15	02.0
46022	40.8N	124.5W	670	28	15.8|18	06	08.7|27	15	12.4
46023	34.3N	120.7W	672	28	16.0|21	00	11.9|24	10	14.6
46024	33.0N	119.2W	668	28	17.0|20	18	10.1|02	21	14.7
46025	37.4N	122.7W	669	28	18.7|20	21	09.4|02	22	15.1
46026	37.8N	122.7W	669	28	14.9|22	22	09.6|01	14	12.6

SEA TEMPERATURE (DEG C)

BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN
41001	34.7N	072.3W	671	28	22.5|22	18	18.4|06	08	20.5
41002	32.3N	075.3W	671	28	23.2|23	05	19.5|14	04	21.1
41006	29.3N	077.5W	396	17	24.3|01	21	21.2|17	08	21.9
42001	25.9N	089.7W	672	28	26.0|14	20	22.7|28	13	24.7
42002	26.0N	093.5W	671	28	23.8|18	19	21.2|23	00	22.7
42003	26.0N	086.0W	224	28	25.4|27	15	23.0|20	03	24.6
42007	30.1N	088.9W	668	28	18.4|26	23	05.0|03	14	12.2
42008	28.7N	095.3W	670	28	18.5|20	03	12.4|10	13	15.9
42009	29.3N	087.5W	671	28	22.7|01	22	08.4|07	18	15.5
42011	29.6N	093.5W	506	22	17.8|17	20	06.2|27	14	13.0
44003	40.8N	068.5W	605	27	12.2|03	13	00.0|06	08	04.3
44004	39.0N	070.0W	653	28	17.6|03	08	01.6|10	19	07.8
44005	42.7N	068.3W	482	24	11.3|03	15	00.0|05	08	03.9
44007	43.5N	070.1W	335	21	08.8|03	16	00.0|08	01	02.8
44008	40.5N	069.4W	541	27	13.1|03	13	00.0|06	14	04.8
46011	56.0N	148.0W	672	28	04.9|22	09	00.4|05	17	03.4
46021	42.5N	130.0W	670	28	12.4|22	14	07.4|04	07	10.2
46031	52.0N	156.0W	669	28	04.1|15	20	00.0|21	08	02.5
46034	51.0N	136.0W	669	28	08.0|19	12	02.4|09	02	06.4
46035	46.0N	131.0W	671	28	10.6|11	03	05.3|26	14	08.3
46036	40.7N	137.7W	660	28	16.9|10	16	10.3|23	16	14.3
46041	46.2N	124.2W	669	28	13.7|11	21	05.7|08	16	09.7
46011	34.9N	120.9W	670	28	16.0|22	20	10.3|02	20	13.9
46012	37.4N	122.7W	506	22	14.7|16	23	11.0|08	03	13.2
46013	38.2N	123.3W	357	15	14.5|07	23	10.2|05	12	12.9
46014	39.2N	124.0W	667	28	15.0|28	21	09.6|05	16	12.8
46019	57.2N	170.3W	059	16	01.9|09	15	00.1|02	00	00.7
46020	55.9N	148.0W	181	24	03.8|27	00	00.3|01	15	02.0
46022	40.8N	124.5W	670	28	15.8|18	06	08.7|27	15	12.4
46023	34.3N	120.7W	672	28	16.0|21	00	11.9|24	10	14.6
46024	33.0N	119.2W	668	28	17.0|20	18	10.1|02	21	14.7
46025	37.4N	122.7W	669	28	18.7|20	21	09.4|02	22	15.1
46026	37.8N	122.7W	669	28	14.9|22	22	09.6|01	14	12.6

AIR-SEA TEMPERATURE DIFFERENCE (DEG C)

BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN
41001	34.7N	072.3W	662	28	00.9|03	00	-15.3|26	12	-06.4
41002	32.3N	075.3W	669	28	01.2|14	09	-11.6|26	15	-04.6
41006	29.3N	077.5W	396	17	01.8|14	04	-05.5|04	14	-02.5
42001	25.9N	089.7W	669	28	00.4|01	06	-08.7|12	23	-03.3
42002	26.0N	093.5W	671	28	01.7|01	03	-07.0|16	10	-02.9
42003	26.0N	086.0W	224	28	00.7|02	03	-08.0|13	21	-06.4
42007	30.1N	088.9W	668	28	05.6|09	18	-08.0|07	14	-01.0
42008	28.7N	095.3W	670	28	05.1|09	22	-11.2|07	18	-04.0
42009	29.3N	087.5W	671	28	00.7|02	23	-03.6|05	17	00.7
42011	29.6N	093.5W	506	22	00.4|08	02	-03.2|04	07	00.1
44003	40.8N	068.5W	605	27	-00.4|15	20	-04.2|06	15	01.9
44004	39.0N	070.0W	653	28	01.8|19	12	-04.0|09	02	00.1
44005	42.7N	068.3W	482	24	01.5|11	03	-03.6|06	19	-00.7
44007	43.5N	070.1W	335	21	05.9|22	09	-00.4|23	16	03.2
44008	40.5N	069.4W	541	27	02.6|11	21	-04.7|27	16	-01.3
46011	56.0N	148.0W	672	28	00.7|26	18	-04.9|02	20	-01.4
46021	42.5N	130.0W	670	28	00.8|23	17	-15.7|05	09	-07.5
46031	52.0N	156.0W	669	28	00.7|03	15	-06.5|05	08	-03.9
46034	51.0N	136.0W	669	28	05.3|03	13	-07.3|06	14	-02.5
46035	46.0N	131.0W	671	28	00.9|17	22	-03.6|05	17	-00.7
46036	40.7N	137.7W	660	28	00.2|11	03	-02.7|04	07	00.1
46041	46.2N	124.2W	669	28	01.5|11	03	-03.6|06	19	-00.7
46011	34.9N	120.9W	670	28	00.7|26	18	-04.9|02	20	-01.4
46012	37.4N	122.7W	506	22	00.6|28	23	-02.9|08	03	-00.8
46013	38.2N	123.3W	357	15	01.0|07	23	-03.7|05	12	-00.8
46014	39.2N	124.0W	667	28	02.1|26	21	-04.1|05	17	-00.7
46019	57.2N	170.3W	059	16	01.1|27	00	-02.8|17	00	-01.1
46020	55.9N	148.0W	181	24	03.4|18	06	-03.6|07	16	-00.1
46022	40.8N	124.5W	670	28	00.8|27	09	-03.5|24	08	-00.8
46023	34.3N	120.7W	672	28	01.2|20	18	-05.1|02	21	-00.8
46024	33.0N	119.2W	668	28	02.3|20	21	-06.6|02	22	-01.1
46025	37.4N	122.7W	669	28	01.3|10	02	-03.4|13	15	-00.6
46026	37.8N	122.7W	669	28	00.7|02	03	-08.0|13	21	-06.4

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PRESSURE (MB)

BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN
41001	34.7N	072.3W	671	28	1029.3|13	14	994.4|15	04	1014.8
41002	32.3N	075.3W	667	28	1027.6|21	16	999.4|14	21	1015.3
41006	29.3N	077.5W	396	17	1024.1|05	16	1004.1|17	07	1014.6
42001	25.9N	089.7W	672	28	1023.7|04	17	998.2|27	16	1013.2
42002	26.0N	093.5W	671	28	1024.6|13	17	999.3|26	23	1013.7
42003	26.0N	086.0W	224	28	1024.0|04	15	1001.0|17	00	1013.5
42007	30.1N	088.9W	671	28	1026.9|04	16	999.8|01	21	1014.2
42008	28.7N	095.3W	668	28	1026.0|13	04	999.9|01	00	1014.3
42009	29.3N	087.5W	666	28	1026.0|04	17	993.3|28	07	1013.8
42011	29.6N	093.5W	506	22	1026.7|13	15	1004.0|09	22	1014.8
44003	40.8N	068.5W	672	28	1030.4|13	16	992.6|24	09	1013.4
44004	39.0N	070.0W	668	28	1031.5|13	16	997.4|24	04	1013.8
44005	42.7N	068.3W	670	28	1031.8|11	15	990.7|08	09	1014.7
44007	43.5N	070.1W	672	28	1033.8|11	16	990.5|03	19	1016.3
44008	40.5N	069.4W	663	28	1031.2|13	16	993.5|07	21	1013.9
46011	56.0N	148.0W	672	28	1010.7|28	23	968.3|20	08	989.6
46021	42.5N	130.0W	670	28	1026.7|19	02	984.7|28	23	1002.6
46031	52.0N	156.0W	671	28	1010.8|28	19	968.7|16	14	986.8
46034	51.0N	136.0W	672	28	1014.0|02	19	973.1|11	07	995.7
46035	46.0N	131.0W	671	28	1014.1|21	06	980.7|25	22	1000.2
46036	40.7N	137.7W	668	28	1015.4|02	20	978.3|28	18	999.5
46041	46.2N	124.2W	669	28	1022.5|14	04	990.9|25	23	1007.7
46011	34.9N	120.9W	671	28	1024.4|13	19	999.8|02	21	1015.1
46012	37.4N	122.7W	506	22	1027.2|14	03	995.6|28	23	1016.0
46013	38.2N	123.3W	357	15	1027.3|14	03	1001.9|02	23	1014.0
46014	39.2N	124.0W	669	28	1027.0|14	03	990.2|28	23	1012.7
46019	57.2N	170.3W	223	28	1023.0|19	03	984.7|06	15	1002.4
46020	55.9N	148.0W	223	28	1008.1|19	12	972.6|24	03	990.0
46022	40.8N	124.5W	669	28	1025.4|19	18	989.4|28	23	1010.3
46023	34.3N	120.7W	672	28	1023.7|13	17	1001.5|02	23	1015.1
46024	33.0N	119.2W	668	28	1022.3|13	18	999.6|02	23	1015.1
46025	37.4N	122.7W	669	28	1021.9|13	18	1001.3|02	22	1015.4
46026	37.8N	122.7W	669	28	1027.5|14	03	995.3|28	23	1014.7

WIND SPEEDS (KNOTS)

BUOY	LAT	LONG	OBS	MAX	DY HR	DIR
41001	34.7N	072.3W	670	45|18	06	350
41002	32.3N	075.3W	666	33|18	01	330
41006	29.3N	077.5W	390	32|14	16	240
42001	25.9N	089.7W	672	41|26	12	090
42002	26.0N	093.5W	662	39|26	16	100
42003	26.0N	086.0W	223	34|13	15	340
42007	30.1N	088.9W	663	28|03	08	290
42008	28.7N	095.3W	668	31|26	14	040
42009	29.3N	087.5W	666	37|28	06	070
42011	29.6N	093.5W	505	28|26	13	040
44003	40.8N	068.5W	669	37|12	06	100
44004	39.0N	070.0W	658	38|11	21	070
44005	42.7N	068.3W	670	43|07	22	110
44007	43.5N	070.1W	668	30|12	10	010
44008	40.5N	069.4W	655	40|12	04	070
46011	56.0N	148.0W	667	26|16	09	080
46021	42.5N	130.0W	657	31|09	11	240
46031	52.0N	156.0W	650	37|14	18	050
46034	51.0N	136.0W	667	40|19	08	140
46035	46.0N	131.0W	668	37|14	06	170
46036	40.7N	137.7W	668	44|13	19	170
46041	46.2N	124.2W	669	31|12	00	190
46011	34.9N	120.9W	671			
46012	37.4N	122.7W	506	33|28	22	150
46013	38.2N	123.3W	357	29|12	04	170
46014	39.2N	124.0W	669	39|28	23	170
46019	57.2N	170.3W	059			
46020	55.9N	148.0W	223	34|18	21	030
46022	40.8N	124.5W	669	39|18	08	160
46023	34.3N	120.7W	672	27|02	13	120
46024	33.0N	119.2W	664	35|02	19	040
46025	37.4N	122.7W	669	28|03	00	360
46026	37.8N	122.7W	669	32|28	21	160

MEAN WIND SPEED (KNOTS)

BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	TOTAL
41001	34.7N	072.3W	19.9	13.6	21.1	25.1	22.2	23.0	24.7	22.1	21.3
41002	32.3N	075.3W	14.9	12.7	14.8	14.7	16.8	18.5	21.1	15.9	16.1
41006	29.3N	077.5W	9.5	12.9	16.1	14.7	16.0	17.8	20.6	14.3	15.7
42001	25.9N	089.7W	16.0	15.5	18.7	20.1	25.2	14.1	16.8	15.3	17.6
42002	26.0N	093.5W	13.7	11.7	17.7	17.5	17.8	9.3	12.3	15.7	15.1
42003	26.0N	086.0W	11.9	14.0	17.6	19.3	22.9	22.6	18.4	13.6	16.3
42007	30.1N	088.9W	12.7	13.0	14.6	12.6	7.7	10.1	14.7	14.2	13.3
42008	28.7N	095.3W	13.6	15.8	14.8	11.6	9.4	9.2	15.1	12.4	13.3
42009	29.3N	087.5W	11.0	13.7	17.3	17.2	15.0	16.3	17.5	12.8	15.2
42011	29.6N	093.5W	13.3	15.9	13.1	11.0	7.7	9.5	13.6	11.7	12.7
44003	40.8N	068.5W	15.8	17.9	16.5	14.8	12.9	11.1	17.4	20.1	16.6
44004	39.0N	070.0W	18.6	17.1	16.1	17.7	17.8	16.1	19.6	19.7	18.2
44005	42.7N	068.3W	19.5	21.2	20.4	17.9	15.2	14.8	16.6	23.0	19.5
44007	43.5N	070.1W	14.5	12.7	8.0	10.6	11.1	10.0	8.0	17.3	12.9
44008	40.5N	069.4W	17.8	17.4	19.1	15.5	10.7	9.9	16.9	17.1	16.6
46011	56.0N	148.0W	7.2	12.9	16.4	12.1	11.9	11.4	10.3	10.3	12.8
46021	42.5N	130.0W	13.9	11.1	19.6	17.3	14.9	18.3	16.0	14.5	16.7
46031	52.0N	156.0W	17.5	19.0	15.5	12.3	11.7	11.7	15.4	14.5	15.0
46034	51.0N	136.0W	9.3	11.4	20.6	20.9	16.7	14.0	18.3	18.4	17.8
46035	46.0N	131.0W	10.9	16.2	15.1	17.1	19.9	17.3	16.9	6.5	17.6
46036	40.7N	137.7W	10.5	27.8	29.6	21.8	23.9	23.1	24.3	18.7	23.3
46041	46.2N	124.2W	14.3	10.4	13.6	13.8	19.1	14.7	10.8	11.2	15.4
46011	34.9N	120.9W									
46012	37.4N	122.7W	5.4	3.7	4.8	13.3	14.0	9.0	12.5	9.4	11.2
46013	38.2N	123.3W	5.1	2.7	14.5	12.2	13.7	12.7	13.9	9.2	12.8
46014	39.2N	124.0W	9.8	4.9	9.2	16.8	17.9	15.0	14.0	14.0	15.8
46019	57.2N	170.3W									
46020	55.9N	148.0W		28.7	17.2	14.3	8.2	11.8	13.7		17.9
46022	40.8N	124.5W	27.9	22.2	16.0	13.4	12.2	14.7	25.5	10.0	17.4
46023	34.3N	120.7W	7.5	4.9	6.7	14.1	21.0	16.7	11.0	10.7	14.7
46024	33.0N	119.2W	16.8	7.1	13.0	13.6	11.5	10.0	8.0	15.5	13.7
46025	37.4N	122.7W	9.3	12.0	11.5	13.0	9.8	11.8	9.9	13.8	12.5
46026	37.8N	122.7W	4.8	9.3	8.8	13.1	15.2	10.9	11.7	10.7	11.6

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WAVE HEIGHTS (METERS)

BUOY	LAT	LONG	OBS	MAX	DY	HR	MEAN
41001	34.7N	072.3W	665	8.0	15	04	3.5
41002	32.3N	075.3W	669	9.0	14	21	3.1
41006	29.3N	077.5W	396	7.0	14	16	2.6
42001	25.9N	089.7W	662	6.5	27	02	2.0
42002	26.0N	093.5W	648	7.5	27	03	1.9
42003	30.1N	088.9W	550	3.0	27	22	1.0
42009	29.3N	087.5W	654	8.0	28	08	2.0
44003	40.8N	068.5W	668	7.5	12	17	3.2
44004	39.0N	070.0W	602	7.0	09	04	2.1
44005	42.7N	068.3W	667	8.0	08	01	2.6
44007	43.5N	070.1W	629	7.0	08	06	1.6
44008	40.5N	069.4W	625	7.5	12	11	2.9
46011	56.0N	148.0W	668	8.0	20	00	3.1
46021	42.5N	130.0W	670	9.0	10	07	4.4
46031	52.0N	156.0W	670	8.0	08	23	3.2
46034	51.0N	136.0W	667	8.5	20	01	4.1
46035	46.0N	131.0W	668	8.5	10	02	4.1
46036	40.7N	137.7W	668	13.0	09	13	5.1
46041	46.2N	124.2W	668	7.0	10	09	3.5
46011	34.9N	120.9W	668	7.0	10	17	3.3
46012	37.4N	122.7W	506	6.0	13	11	3.7
46013	38.2N	123.3W	356	7.0	10	11	3.3
46014	39.2N	124.0W	277	7.5	10	13	3.6
46022	40.8N	124.5W	669	8.0	10	06	3.9
46023	34.3N	120.7W	668	6.5	10	19	3.2
46024	33.0N	119.2W	657	7.0	14	03	3.0
46025	37.4N	122.7W	668	6.0	13	10	2.8
46026	37.8N	122.7W	643	6.0	10	16	3.0

FREQUENCY OF WAVE HEIGHTS (%)

BUOY	LAT	LONG	<1M	1-1.5M	2-2.5M	3-3.5M	4-5.5M	6-7.5M	8-9.5M	>9.5M
41001	34.7N	072.3W		12.7	20.0	23.1	36.2	7.6	0.1	
41002	32.3N	075.3W		14.6	26.3	30.0	24.9	3.5	0.4	
41006	29.3N	077.5W	1.7	19.9	42.1	19.4	14.1	2.5		
42001	25.9N	089.7W	9.8	35.8	32.0	10.4	11.1	0.7		
42002	26.0N	093.5W	11.2	39.5	33.1	8.1	4.9	2.9		
42003	30.1N	088.9W	39.0	48.7	11.8	0.3				
42009	29.3N	087.5W	19.4	29.0	34.4	16.6	8.4	1.8	0.1	
44003	40.8N	068.5W		12.8	31.5	19.0	31.8	4.6		
44004	39.0N	070.0W		13.4	26.9	14.6	37.2	7.8		
44005	42.7N	068.3W		31.3	23.3	20.8	15.7	4.4	0.4	
44007	43.5N	070.1W	3.7	49.1	17.8	8.2	6.0	0.9		
44008	40.5N	069.4W	17.8	19.2	36.0	15.0	26.5	2.8		
46011	56.0N	148.0W	0.3	8.9	33.3	35.7	24.5	1.3		
46021	42.5N	130.0W		0.1	4.9	27.1	54.4	12.3	0.8	
46031	52.0N	156.0W		1.3	32.3	41.9	23.2	1.0		
46034	51.0N	136.0W			8.9	29.0	53.5	7.6	0.7	
46035	46.0N	131.0W		1.3	7.4	31.8	52.2	6.2	0.7	
46036	40.7N	137.7W			3.5	12.9	56.2	22.9	3.1	1.4
46041	46.2N	124.2W		5.8	21.1	35.7	30.9	6.2		
46011	34.9N	120.9W		1.7	24.7	41.6	28.7	1.0		
46012	37.4N	122.7W		0.1	15.0	39.7	44.2	0.7		
46013	38.2N	123.3W		4.4	27.2	42.4	22.7	3.0		
46014	39.2N	124.0W		2.5	15.1	41.5	35.3	5.4		
46022	40.8N	124.5W		0.8	9.7	34.9	47.8	6.4	0.1	
46023	34.3N	120.7W		3.4	25.1	43.7	26.7	0.8		
46024	33.0N	119.2W		6.5	41.2	30.5	20.0	1.5		
46025	37.4N	122.7W		36.0	48.3	14.0	1.4			
46026	37.8N	122.7W		3.8	37.1	36.0	22.5	0.3		

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TOTAL FREQUENCY OF WIND SPEEDS (%)

BUOY	LAT	LONG	CALM	<4KT	4-10KT	11-21KT	22-33KT	34-47KT	>47KT
41001	34.7N	072.3W		2.0	13.2	45.6	35.9	3.0	
41002	32.3N	075.3W		2.5	23.1	60.9	13.5		
41006	29.3N	077.3W		7.0	39.2	46.1	7.7		
42001	25.9N	089.7W		2.9	33.9	52.5	10.4	0.3	
42002	26.0N	093.5W		3.1	32.7	56.4	7.7		
42003	26.0N	086.0W	0.2	6.2	44.2	46.4	3.2		
42007	30.1N	088.9W		10.2	42.0	43.4	3.8	0.7	
42008	28.7N	095.3W	0.1	5.3	41.0	42.4	11.2		
42009	29.3N	087.5W		10.1	44.8	39.6	4.9	0.7	
42011	29.6N	093.5W	0.8	6.9	40.6	44.1	8.8		
44003	40.8N	068.5W		2.7	27.0	64.0	6.3		
44004	39.0N	070.0W		3.0	16.6	58.3	21.7	0.3	
44005	42.7N	068.3W		1.1	19.3	52.2	26.2	1.2	
44007	43.5N	070.1W		5.3	24.6	65.9	4.2		
44008	40.5N	069.4W		2.6	23.5	64.9	9.0		
46001	56.0N	148.0W		1.4	15.5	63.4	19.6	0.1	
46002	42.5N	130.5W		0.7	14.8	66.6	17.4	0.5	
46003	52.0N	156.0W		1.9	11.5	47.1	36.8	2.7	
46004	51.0N	136.0W		0.4	5.6	39.8	49.9	4.3	
46005	46.0N	131.0W		1.6	9.9	47.5	36.6	4.5	
46006	40.7N	137.7W		1.2	6.6	42.4	42.4	6.9	0.5
46010	46.2N	124.2W		1.4	10.4	75.1	7.1		
46011	34.9N	120.9W		19.8	44.5	34.7	1.0		
46012	37.4N	122.7W		12.2	34.8	41.0	11.6	0.3	
46013	38.2N	123.3W		2.3	23.9	64.9	8.4	0.4	
46014	39.2N	124.0W		11.7	36.4	38.5	13.2	0.3	
46016	63.3N	170.3W		1.9	30.2	39.1	17.7	10.7	0.5
46017	60.3N	172.3W		9.7	28.3	34.5	24.8	2.7	
46018	60.3N	177.0W			17.0	44.4	14.8	3.7	
46019	57.2N	170.3W		5.7	25.6	39.0	27.2	2.4	
46020	55.9N	168.0W		0.4	22.4	48.4	25.6	3.3	
46022	40.8N	124.5W		9.5	36.1	44.2	8.6	1.6	
46023	34.3N	120.7W		17.0	26.3	46.5	10.2		
46024	33.0N	119.2W		15.5	43.5	31.7	9.1	0.2	
46025	33.8N	119.3W		27.6	47.2	21.2	4.0		
46026	37.8N	122.7W		5.5	29.4	60.5	4.6		

TOTAL FREQUENCY OF WIND DIRECTIONS (%)

BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW
41001	34.7N	072.3W	9.1	11.3	13.3	8.2	6.4	9.4	17.1	25.1
41002	32.3N	075.3W	11.8	9.3	12.3	8.8	6.8	16.3	19.2	17.6
41006	29.3N	077.3W	11.3	5.7	11.8	6.9	12.2	18.6	17.7	23.8
42001	25.9N	089.7W	27.7	27.2	8.8	11.5	2.9	3.8	6.1	10.8
42002	26.0N	093.5W	18.5	28.2	17.8	17.2	9.9	1.4	4.8	11.8
42003	26.0N	086.0W	26.2	17.5	13.8	10.8	3.9	2.8	4.5	22.8
42007	30.1N	088.9W	15.1	16.1	17.3	7.2	9.6	11.3	12.1	11.3
42008	28.7N	095.3W	21.5	21.1	14.8	8.1	10.7	6.8	5.3	14.5
42009	29.3N	087.5W	19.3	7.9	13.8	13.9	4.4	3.9	14.6	22.3
42011	29.6N	093.5W	18.6	20.6	12.2	10.5	7.4	8.7	8.3	13.8
44003	40.8N	068.5W	16.4	10.1	8.2	12.1	4.3	3.9	24.5	18.5
44004	39.0N	070.0W	18.0	11.0	12.8	5.6	3.9	2.4	18.6	27.5
44005	42.7N	068.3W	28.3	11.9	7.7	9.9	6.9	10.0	18.5	14.8
44007	43.5N	070.1W	22.0	11.6	1.9	6.2	2.2	12.4	24.8	18.9
44008	40.5N	069.4W	19.4	11.8	8.0	12.1	3.4	5.8	20.5	29.0
46001	56.0N	148.0W	7.0	9.1	25.8	18.9	5.8	5.8	14.1	10.3
46002	42.5N	130.5W	1.4	1.4	1.7	14.9	28.7	33.5	11.2	7.2
46003	52.0N	156.0W	24.7	17.4	9.1	5.5	3.9	3.1	12.8	23.4
46004	51.0N	136.0W	8.2	8.3	10.7	25.8	26.1	18.3	13.1	5.5
46005	46.0N	131.0W	1.3	8.3	2.8	11.7	39.0	31.3	11.2	2.5
46006	40.7N	137.7W	2.7	1.3	0.7	6.1	21.7	44.2	16.9	6.4
46010	46.2N	124.2W	1.2	1.4	30.1	15.9	20.4	21.1	8.4	1.4
46011	34.9N	120.9W	31.6	17.5	8.4	8.1	15.6	5.5	6.9	8.5
46012	37.4N	122.7W	26.9	7.9	19.9	12.1	18.9	6.4	3.3	6.7
46013	38.2N	123.3W	3.4	1.9	42.0	14.1	9.8	6.5	5.4	17.6
46014	39.2N	124.0W	19.7	7.5	9.2	16.4	27.8	8.1	3.9	7.4
46016	63.3N	170.3W	12.2	61.0	12.3	5.8	2.0	2.8	3.4	0.5
46017	60.3N	172.3W	3.5	44.0	20.4	9.2	7.3	6.8	3.7	1.1
46018	60.3N	177.0W	25.7	47.4	3.9	3.1	10.6	3.3	1.5	4.4
46019	57.2N	170.3W	9.3	44.9	20.2	8.0	6.2	6.7	1.1	1.4
46020	55.9N	168.0W	13.4	2.3	3.6	1.7	4.6			
46022	40.8N	124.5W	9.8	5.1	4.1	29.2	38.2	12.7	3.7	2.3
46023	34.3N	120.7W	19.5	2.2	9.2	19.1	6.5	5.4	6.8	31.5
46024	33.0N	119.2W	12.7	3.5	1.6	7.5	18.7	7.7	10.3	43.0
46025	33.8N	119.3W	5.9	7.4	9.9	12.3	7.4	6.2	25.2	25.7
46026	37.8N	122.7W	1.9	13.1	49.5	8.6	9.6	5.3	5.1	6.8

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% FREQUENCY OF WIND SPEEDS (<4 KTS)

BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW
41001	34.7N	072.3W	0.5	0.4		<.05	0.2	0.4	0.2	0.2
41002	32.3N	075.3W	0.3	0.4	0.5	0.2	0.4	0.3	0.2	0.2
41006	29.3N	077.3W	1.0	0.9	0.9	0.9	0.9	0.3	1.4	0.4
42001	25.9N	089.7W	0.7	0.2	0.4	1.0	0.2		0.1	0.2
42002	26.0N	093.5W	0.1	0.7	1.4	0.2	0.4		0.3	
42003	26.0N	086.0W	2.0	2.1	0.8	0.2	0.5	0.2	0.1	0.3
42007	30.1N	088.9W	1.0	1.4	1.4	0.4	1.2	1.5	1.9	1.3
42008	28.7N	095.3W	0.8	0.1	0.4	0.3	1.2	0.4	0.2	1.4
42009	29.3N	087.5W	1.8	0.8	0.4	0.4	0.7	0.3	2.0	3.4
42011	29.6N	093.5W	0.7	1.3	1.0	0.8	0.8	0.2	0.7	1.5
44003	40.8N	068.5W	0.6	0.4	0.5	0.5	0.4	0.3		0.2
44004	39.0N	070.0W	1.1	0.9	0.1	0.1	0.1		0.2	0.4
44005	42.7N	068.3W	0.1	0.6	0.1	0.1		0.1		
44007	43.5N	070.1W	0.5	1.0	0.7	0.6	0.4	0.2	1.2	0.7
44008	40.5N	069.4W	0.7	0.8	0.5	0.2	0.1	0.2		0.5
46001	56.0N	148.0W		0.3	0.2	0.1	0.3	0.1		0.3
46002	42.5N	130.0W		0.1		0.1	0.1	0.2		
46003	52.0N	156.0W	0.3	0.2		0.3	0.5	0.2	0.1	0.3
46004	51.0N	136.0W		0.1		0.1				0.1
46005	46.0N	131.0W	0.1	0.3		0.1	0.3	0.3	0.4	0.1
46006	40.7N	137.7W	0.5	0.2	0.1	0.2	0.2	0.05		0.2
46010	46.2N	124.2W	0.6	0.2	0.6	0.2				
46011	34.9N	120.9W	0.4	0.2	0.4	0.4	0.3	0.2		
46012	37.4N	122.7W	0.1	0.1	0.2	0.1	0.1	0.1		
46013	38.2N	123.3W		0.1	0.1	0.1	0.1	0.1		
46014	39.2N	124.0W	0.5	0.2	0.6	0.1	0.2			
46016	63.3N	170.3W	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
46017	60.3N	172.3W	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
46018	60.3N	177.0W								
46019	57.2N	170.3W	0.4		0.4	0.4	0.3	0.2		
46020	55.9N	168.0W			0.4					
46022	40.8N	124.5W	0.1		0.1	0.1	0.1	0.1		
46023	34.3N	120.7W	0.2			1.5	0.4	0.2	0.1	0.2
46024	33.0N	119.2W					1.0	0.7	0.2	1.2
46025	33.8N	119.3W					1.0	0.1		0.1
46026	37.8N	122.7W					1.6	3.0	<.05	

% FREQUENCY OF WIND SPEEDS (4-10 KTS)

BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW
41001	34.7N	072.3W	1.5	1.5	1.5	0.6	0.1	2.7	1.9	3.3
41002	32.3N	075.3W	1.6	1.3	4.2	3.1	3.3	8.4	4.1	5.5
41006	29.3N	077.3W	4.3	2.7	4.4	3.7	4.6	8.6	2.6	1.6
42001	25.9N	089.7W	3.1	5.6	0.6	0.1	3.0	2.9	11.6	8.1
42002	26.0N	093.5W	7.1	5.7	1.3	0.7	2.2	2.3	14.2	9.1
42003	26.0N	086.0W	4.1	4.4	2.5	1.0	1.6	5.7	12.4	2.4
42007	30.1N	088.9W	3.7	6.3	8.5	4.1	5.7	3.2	6.5	4.1
42008	28.7N	095.3W	4.8	8.8	6.5	4.6	6.3	3.9	2.0	4.0
42009	29.3N	087.5W	8.0	4.4	6.7	6.0	1.5	0.8	5.8	12.0
42011	29.6N	093.5W	4.9	3.1	3.9	5.9	2.6	1.5	6.1	10.7
44003	40.8N	068.5W	3.1	1.6	3.1	1.8	1.7	4.8	5.4	9.8
44004	39.0N	070.0W	1.1	0.9	0.1	0.1	0.1		0.2	0.4
44005	42.7N	068.3W	0.1	0.6	0.1	0.1		0.1		
44007	43.5N	070.1W	0.5	1.0	0.7	0.6	0.4	0.2	1.2	0.7
44008	40.5N	069.4W	0.7	1.3	1.0	0.8	0.8	0.2	0.7	1.5
46001	56.0N	148.0W		0.3	0.2	0.1	0.3	0.1		0.3
46002	42.5N	130.0W		0.1		0.1	0.1	0.2		
46003	52.0N	156.0W	0.3	0.2		0.3	0.5	0.2	0.1	0.3
46004	51.0N	136.0W		0.1		0.1				0.1
46005	46.0N	131.0W	0.1	0.3		0.1	0.3	0.3	0.4	0.1
46006	40.7N	137.7W	0.5	0.2	0.1	0.2	0.2	0.05		0.2
46010	46.2N	124.2W	0.6	0.2	0.6	0.2				
46011	34.9N	120.9W	0.4	0.2	0.4	0.4	0.3	0.2		
46012	37.4N	122.7W	0.1		0.2	0.1	0.1	0.1		
46013	38.2N	123.3W			0.1	0.1	0.1	0.1		
46014	39.2N	124.0W	0.5	0.2	0.6	0.1	0.2			
46016	63.3N	170.3W	0.7	16.0	0.3	0.1	0.1			
46017	60.3N	172.3W	0.8	16.9	4.4	0.9	0.9	0.9		
46018	60.3N	177.0W	0.6	14.3						
46019	57.2N	170.3W		19.2	4.8	2.8		0.4		
46020	55.9N	168.0W	8.8	6.5	6.1	1.6	0.4		0.1	
46022	40.8N	124.5W	0.1			1.2	6.3	0.8	0.1	<.05
46023	34.3N	120.7W	2.2		1.5	4.2	0.2	<.05	0.5	1.6
46024	33.0N	119.2W				1.0	0.7	0.2	1.2	6.0
46025	33.8N	119.3W				1.0	0.1		0.8	2.1
46026	37.8N	122.7W				1.6	3.0	<.05		

% FREQUENCY OF WIND SPEEDS (11-21 KTS)

BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW
41001	34.7N	072.3W	4.2	5.9	5.8	2.8	3.6	3.7	8.4	11.9
41002	32.3N	075.3W	3.1	3.3	8.4	4.1	5.5	6.2	4.8	8.7
41006	29.3N	077.3W	2.6	1.6	3.3	2.4	4.8	5.8	10.0	11.3
42001	25.9N	089.7W	1.4	2.7	1.1	0.8	1.2	2.1	5.8	4.8
42002	26.0N	093.5W	1.1	0.2	6.2	9.2	7.3	0.6	1.5	8.2
42003	26.0N	086.0W	2.3	1.5	15.0	7.1	2.3	0.7	1.2	2.3
42007	30.1N	088.9W	7.3	6.9	2.5	3.2	1.6	1.1	7.9	7.9
42008	28.7N	095.3W	2.8	1.4	0.9	1.1	1.2	2.9	6.5	4.6
42009	29.3N	087.5W	5.8	12.0	2.8	2.6	1.1	0.8	2.1	2.9
42011	29.6N	093.5W	5.6	10.7	8.0	4.3	1.4	2.7	2.7	4.9
44003	40.8N	068.5W	5.4	9.8	3.8	5.3	8.2	1.9	3.9	18.2
44004	39.0N	070.0W	1.1	0.9	0.1	0.1	0.1	0.2	0.4	4.2
44005	42.7N	068.3W	0.1	0.6	0.1	0.1		0.1		
44007	43.5N	070.1W	0.5	1.0	0.7	0.6	0.4	0.2	1.2	0.7
44008	40.5N	069.4W	0.7	1.3	1.0	0.8	0.8	0.2	0.7	1.5
46001	56.0N	148.0W		0.3	0.2	0.1	0.3	0.1		0.3
46002	42.5N	130.0W		0.1		0.1	0.1	0.2		
46003	52.0N	156.0W	0.3	0.2		0.3	0.5	0.2	0.1	0.3
46004	51.0N	136.0W		0.1		0.1				0.1
46005	46.0N	131.0W	0.1	0.3		0.1	0.3	0.3	0.4	0.1
46006	40.7N	137.7W	0.5	0.2	0.1	0.2	0.2	0.05		0.2
46010	46.2N	124.2W	0.6	0.2	0.6	0.2				
46011	34.9N	120.9W	0.4	0.2	0.4	0.4	0.3	0.2		
46012	37.4N	122.7W	0.1		0.2	0.1	0.1	0.1		
46013	38.2N	123.3W			0.1	0.1	0.1	0.1		
46014	39.2N	124.0W	0.5	0.2	0.6	0.1	0.2			
46016	63.3N	170.3W	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
46017	60.3N	172.3W	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
46018	60.3N	177.0W								
46019	57.2N	170.3W	0.4		0.4	0.4	0.3	0.2		
46020	55.9N	168.0W			0.4					
46022	40.8N	124.5W	0.1		0.1	0.1	0.1	0.1		
46023	34.3N	120.7W	0.2			1.5	0.4	0.2	0.1	0.2
46024	33.0N	119.2W					1.0	0.7	0.2	1.2
46025	33.8N	119.3W					1.0	0.1		0.1
46026	37.8N	122.7W					1.6	3.0	<.05	

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% FREQUENCY OF WIND SPEEDS (22- 33 KTS)

BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW
41001	34.7N	072.3W	2.7	4.1	5.6	4.1	2.0	2.4	6.5	8.5
41002	32.3N	075.3W	0.1	1.2	3.2	0.4	0.7	1.1	3.0	3.3
41006	29.3N	077.3W			3.3	0.4	0.7	1.9	0.9	0.9
42001	25.9N	089.7W	1.5	0.3		2.2	0.1	2.6	0.9	2.9
42002	26.0N	093.5W	1.2	<.05	2.3	2.2	0.6	<.05		1.3
42003	26.0N	086.0W			1.5		0.2	0.2	0.4	1.0
42007	30.1N	088.9W	0.1	1.7	0.5		0.2	<.05	0.1	1.0
42008	28.7N	095.3W	4.0	4.9	1.0	0.1				1.2
42009	29.3N	087.5W	0.5	<.05	2.3	0.6	0.1		0.5	0.8
42011	29.6N	093.5W	2.3	4.3	0.4	0.6			0.1	1.1
44003	40.8N	068.5W	0.6	2.6	0.8	0.3	0.2		1.5	0.1
44004	39.0N	070.0W	2.7	3.7	2.2	0.7	0.4		4.7	7.3
44005	42.7N	068.3W	3.1	2.6	1.4	2.2	1.3	2.8	8.0	4.8
44007	43.5N	070.1W	1.6	1.5		0.4	0.4	<.05	0.2	0.1
44008	40.5N	069.4W	0.8	2.2	0.4	1.3		0.1	2.4	1.0
46001	56.0N	148.0W	1.1	0.8	4.7	5.5		0.7	4.8	1.9
46002	42.5N	130.0W				4.9	4.4	5.2	1.5	1.4
46003	52.0N	156.0W	8.0	7.7	3.8	1.8	1.3	0.7	1.9	11.7
46004	51.0N	136.0W		0.2	8.5	14.9	11.1	8.6	4.2	2.4
46005	46.0N	131.0W			1.9	5.1	10.3	5.5	4.4	0.4
46006	40.7N	137.7W				2.9	11.1	19.8	6.3	2.3
46010	46.2N	124.2W			0.3	0.6	3.9	1.7	0.5	<.05
46011	34.9N	120.9W		0.2			0.8			
46012	37.4N	122.7W	0.1			2.2	0.5	0.6		<.05
46013	38.2N	123.3W			0.7	1.3	3.5	0.6	0.1	2.2
46014	39.2N	124.0W	1.9			2.2	0.4	1.0	0.2	1.5
46016	63.3N	170.3W	0.7	16.0	0.3	0.6				
46017	60.3N	172.3W	0.8	16.9	4.4	0.9	0.9	0.9		
46018	60.3N	177.0W	0.6	14.3						
46019	57.2N	170.3W		19.2	4.8	2.8		0.4		
46020	55.9N	168.0W	8.8	6.5	6.1	1.6	0.4		0.1	
46022	40.8N	124.5W	0.1			1.2	6.3	0.8	0.1	<.05
46023	34.3N	120.7W	2.2		1.5	4.2	0.2	<.05	0.5	1.6
46024	33.0N	119.2W				1.0	0.7	0.2	1.2	6.0
46025	33.8N	119.3W				1.0	0.1		0.8	2.1
46026	37.8N	122.7W				1.6	3.0	<.05		

% FREQUENCY OF WIND SPEEDS (34-47 KTS)

BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW
41001	34.7N	072.3W	0.2		0.3	0.6	0.5	0.2		1.1
41002	32.3N	075.3W								
41006	29.3N	077.3W								
42001	25.9N	089.7W					0.3	<.05		
42002	26.0N	093.5W								
42003	26.0N	086.0W								
42007	30.1N	088.9W				0.5	0.2			
42008	28.7N	095.3W								
42009	29.3N	087.5W				0.6	<.05			
42011	29.6N	093.5W								
44003	40.8N	068.5W								
44004	39.0N	070.0W			0.3					
44005	42.7N	068.3W				0.8	0.2	0.1		0.1
44007	43.5N	070.1W								
44008	40.5N	069.4W								
46001	56.0N	148.0W							0.1	
46002	42.5N	130.0W								
46003	52.0N	156.0W				0.1	0.4			
46004	51.0N	136.0W				0.1	2.1	1.4		
46005	46.0N	131.0W				0.4	2.1	1.9	0.3	
46006	40.7N	137.7W				1.5	1.0	2.2	1.9	0.4
46010	46.2N	124.2W								
46011	34.9N	120.9W								
46012	37.4N	122.7W							<.05	0.3
46013	38.2N	123.3W							0.4	
46014	39.2N	124.0W				0.2	3.1	<.05		
46016	63.3N	170.3W								
46017	60.3N	172.3W				2.7				
46018	60.3N	177.0W				3.7				
46019	57.2N	170.3W				2.1	0.3			
46020	55.9N	168.0W								
46022	40.8N	124.5W								
46023	34.3N	120.7W							1.6	
46024	33.0N	119.2W						0.3		
46025	33.8N	119.3W								
46026	37.8N	122.7W								

% FREQUENCY OF WIND SPEEDS (>47 KTS)

BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW
41001	34.7N	072.3W								
41002	32.3N	075.3W								
41006	29.3N	077.3W								
42001	25.9N	089.7W								
42002	26.0N	093.5W								
42003	26.0N	086.0W								
42007	30.1N	088.9W								
42008	28.7N	095.3W								
42009	29.3N	087.5W								
42011	29.6N	093.5W								
44003	40.8N	068.5W								
44004	39.0N	070.0W								
44005	42.7N	068.3W								
44007	43.5N	070.1W								
44008	40.5N	069.4W								
46001	56.0N	148.0W								
46002	42.5N	130.0W								
46003	52.0N	156.0W								
46004	51.0N	136.0W								
46005	46.0N	131.0W								
46006	40.7N	137.7W								
46010	46.2N	124.2W								
46011	34.9N	120.9W								
46012	37.4N	122.7W								
46013	38.2N	123.3W								
46014	39.2N	124.0W								
46016	63.3N	170.3W								
46017	60.3N	172.3W								
46018	60.3N	177.0W								
46019	57.2N	170.3W								
46020	55.9N	168.0W								
46022	40.8N	124.5W								
46023	34.3N	120.7W								
46024	33.0N	119.2W								
46025	33.8N	119.3W								
46026	37.8N	122.7W								

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			AIR TEMPERATURE (DEG C)								SEA TEMPERATURE (DEG C)								AIR-SEA TEMPERATURE DIFFERENCE (DEG C)							
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN		OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN		OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	
41001	34.7N	072.3W	734	31	21.6	11 05	04.1	19 19	14.6		742	31	22.2	10 22	10.8	29 12	20.2		742	31	01.4	24 00	-15.9	19 19	-05.7	
41002	32.3N	075.3W	740	31	22.7	02 21	08.8	19 11	17.5		740	31	22.8	03 13	19.8	30 01	21.5		740	31	00.9	23 22	-12.1	19 11	-04.0	
41006	29.3N	077.3W	742	31	25.0	02 01	14.4	19 11	20.3		742	31	25.7	01 15	22.9	24 05	24.0		742	31	00.5	02 01	-09.0	19 11	-03.6	
42001	25.9N	089.7W	658	29	29.7	01 02	15.7	12 20	20.6		658	29	27.6	25 18	24.3	23 20	25.5		658	29	-00.6	19 21	-09.4	12 20	-05.0	
42002	26.0N	093.5W	741	31	24.3	31 15	16.0	03 00	19.8		741	31	24.4	01 03	22.2	17 18	23.1		741	31	00.6	31 23	-08.0	03 00	-03.3	
42003	26.0N	086.0W	659	31	25.6	02 17	14.9	13 04	20.4		659	31	25.9	01 19	24.6	19 20	25.2		663	31	-00.1	30 21	-10.3	13 04	-04.7	
42007	30.1N	088.9W	737	31	19.0	02 04	02.2	16 15	11.3																	
42008	28.7N	095.3W	738	31	19.7	08 11	04.0	27 12	12.2		119	05	14.2	31 09	11.8	27 14	13.2		119	05	06.2	30 01	-06.0	27 12	00.6	
42009	29.3N	087.5W	610	26	21.6	20 20	07.6	12 16	15.3		610	26	21.8	09 20	19.2	27 01	20.5		610	26	00.9	20 20	-13.0	12 16	-05.2	
42011	29.6N	093.5W	741	31	18.8	10 22	04.2	06 09	11.1																	
44003	40.8N	068.5W	645	29	13.7	11 14	00.0	21 05	05.9		742	31	10.1	03 07	06.0	29 23	08.4		742	31	04.3	11 14	-09.5	04 12	-03.3	
44004	39.0N	070.0W	686	31	16.0	11 06	00.0	20 13	09.0		720	31	22.1	31 06	15.5	20 23	16.8		731	31	01.4	20 03	-16.0	19 02	-08.2	
44005	42.7N	068.3W	520	27	13.2	11 15	00.0	30 05	04.8		739	31	07.9	11 12	06.4	30 09	07.2		740	31	05.3	11 15	-07.5	03 05	-03.7	
44007	43.5N	070.1W	334	19	10.7	11 14	00.0	13 09	03.7		739	31	07.8	02 03	03.8	24 03	06.0		742	31	03.4	11 10	-07.2	01 06	-04.2	
44008	40.5N	069.4W	613	28	13.5	11 12	00.0	18 04	05.7		726	31	10.0	02 17	06.5	21 03	08.4		730	31	04.7	11 12	-08.3	04 11	-03.6	
46001	56.0N	148.0W	581	29	05.7	02 01	00.1	06 22	03.7		742	31	05.3	01 01	04.1	23 10	04.5		742	31	01.0	25 09	-05.1	06 22	-01.6	
46002	42.5N	130.0W	740	31	12.3	25 16	07.8	19 09	10.5		741	31	11.1	13 04	10.0	26 17	10.5		742	31	02.1	25 16	-03.2	14 00	-00.1	
46003	52.0N	156.0W	532	24	05.1	23 00	00.0	15 03	02.9		741	31	05.5	01 01	04.3	14 23	04.7		741	31	00.4	23 00	-04.6	15 03	-02.5	
46004	51.0N	136.0W	738	31	09.4	11 09	02.1	13 03	06.7		739	31	07.3	01 02	06.4	20 05	06.7		740	31	02.5	11 09	-04.5	13 03	00.0	
46005	46.0N	131.0W	740	31	10.6	11 07	05.6	19 11	08.8		741	31	10.7	01 18	08.9	27 14	09.6		741	31	01.4	25 06	-03.7	03 14	-00.8	
46006	40.7N	137.7W	734	31	17.7	17 05	10.9	28 09	15.1		741	31	12.0	05 23	10.6	30 03	11.3		741	31	06.4	17 05	-00.3	27 02	03.8	
46010	48.2N	124.2W	735	31	14.2	26 21	08.4	21 11	09.3		735	31	11.4	08 06	06.9	08 23	10.6		737	31	03.3	26 21	-05.8	21 11	-01.3	
46011	34.9N	120.9W	737	31	20.0	13 01	10.0	21 15	14.3		739	31	17.1	14 22	14.7	04 16	15.5		739	31	04.1	13 01	-05.4	21 15	-01.2	
46012	37.4N	122.7W	638	27	18.6	11 11	09.7	20 14	13.1		639	27	14.7	26 21	13.2	01 02	13.8		639	27	05.3	11 11	-04.2	20 14	-00.7	
46013	38.2N	123.3W	740	31	15.1	26 15	06.1	05 13	11.3		740	31	14.6	30 22	12.2	08 10	13.3		740	31	01.4	10 23	-06.9	01 16	-02.0	
46014	39.2N	124.0W	739	31	14.9	23 22	06.8	20 16	12.1		740	31	14.1	31 22	12.4	20 17	13.3		740	31	00.4	23 22	-06.4	20 16	-01.2	
46019	57.2N	147.3W	027	06	02.2	26 12	00.1	03 23	00.9																	
46020	55.9N	148.0W	069	11	03.6	26 03	00.0	30 21	01.6		246	31	04.3	01 12	01.9	22 18	03.0		109	14	01.3	26 03	-02.4	18 06	-01.2	
46022	40.8N	124.5W	739	31	16.0	23 22	06.9	20 17	11.9		739	31	13.1	15 16	11.8	11 13	12.5		739	31	03.3	23 22	-05.9	20 17	-00.6	
46023	34.3N	120.7W	741	31	19.0	11 18	11.6	20 15	15.0		740	31	17.0	11 14	23	14.9	02 11	15.6	742	31	03.8	11 18	-04.3	20 15	-00.6	
46024	33.0N	119.2W	737	31	21.9	12 02	12.0	29 05	15.2		737	31	17.9	11 22	15.0	31 04	15.9		737	31	05.8	12 02	-03.6	29 05	-00.6	
46025	33.8N	119.3W	735	31	22.4	11 11	11.9	06 09	15.5		736	31	17.6	12 22	14.5	05 16	15.9		737	31	07.2	11 11	-04.5	22 09	-00.4	
46026	37.8N	122.7W	734	31	14.9	26 07	05.3	02 18	10.5		733	31	14.2	27 02	10.7	07 11	12.1		735	31	03.3	10 04	-06.1	02 18	-01.6	

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			PRESSURE (MB)								WIND SPEEDS (KNOTS)								MEAN WIND SPEED (KNOTS)								
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN		OBS	MAX	DY HR	DIR		N	NE	E	SE	S	SW	W	NW	TOTAL
41001	34.7N	072.3W	742	31	1030.5	05 03	1000.2	26 21	1017.3		733	40	15 16	200		17.2	17.5	20.0	23.0	20.4	15.6	19.4	19.4	19.1	
41002	32.3N	075.3W	740	31	1027.3	20 03	1004.8	12 10	1016.9		727	29	28 12	250		11.7	13.0	15.3	15.1	14.3	13.2	15.6	15.4	14.4	
41006	29.3N	077.3W	742	31	1025.2	14 15	1008.7	22 21	1017.1		725	29	21 02	100		8.1	8.0	14.0	10.6	11.3	13.1	12.7	11.7	11.6	
42001	25.9N	089.7W	658	29	1030.5	13 13	1001.9	20 03	1018.2		655	33	03 12	080		13.0	12.0	9.2	12.6	15.8	21.7	12.4	15.8	13.1	
42002	26.0N	093.5W	741	31	1029.6	17 17	1002.8	31 22	1018.3		736	28	31 17	150		14.8	10.4	11.6	13.4	14.2	11.4	8.8	15.9	12.9	
42003	26.0N	086.0W	658	31	1027.4	13 16	1005.0	20 22	1017.8		647	32	20 04	090		9.9	7.5	13.3	12.4	9.4	11.3	12.4	13.7	11.1	
42007	30.1N	088.9W	738	31	1028.7	04 16	998.8	20 22	1018.6		715	38	20 12	100		12.5	12.2	10.7	9.5	8.6	10.8	8.7	12.0	10.8	
42008	28.7N	095.3W	741	31	1032.3	31 12	999.5	31 21	1019.3		729	33	19 14	080		14.8	14.7	11.4	8.7	8.0	8.1	8.4	13.1	12.2	
42009	29.3N	087.5W	610	26	1028.5	13 16	1000.8	20 21	1017.7		596	37	20 10	100		10.6	8.3	13.9	11.6	10.8	12.7	10.4	9.0	10.7	
42011	29.6N	093.5W	741	31	1032.4	12 16	999.3	31 23	1019.3		726	31	20 02	040		13.8	14.3	9.6	11.0	9.2	9.2	10.8	12.0	11.8	
44003	40.8N	068.5W	742	31	1040.1	05 03	989.9	16 16	1016.4		736	34	29 05	060		13.0	14.5	12.0	13.1	10.7	11.4	14.9	13.1	13.4	
44004	39.0N	070.0W	720	31	1037.4	05 01	994.6	16 10	1016.7		727	36	28 22	030		14.6	16.3	15.8	15.5	14.5	14.5	18.3	17.0	16.3	
44005	42.7N	068.3W	739	31	1040.9	05 03	987.5	17 00	1016.9		737	41	16 07	090		15.6	13.3	17.3	17.4	15.8	17.7	20.5	17.6	17.1	
44007	43.5N	070.1W	742	31	1041.1	04 23	988.6	16 19	1017.6		735	29	11 12	170		13.0	12.5	5.8	12.3	13.4	13.5	13.7	12.7	13.0	
44008	40.5N	069.4W	726	31	1039.8	05 02	990.9	16 18	1016.7		720	29	16 22	270		12.7	14.3	13.8	14.2	12.0	12.8	16.5	13.6	14.1	
46001	56.0N	148.0W	742	31	1008.6	11 06	960.8	26 13	987.8		740	35	07 23	270		15.3	14.6	16.1	16.9	11.6	14.2	18.9	16.4	16.3	
46002	42.5N	130.0W	739	31	1029.4	09 01	1008.5	01			737	36	25 13	160		11.2	9.9	7.3	17.4	17.3	16.5	15.1	15.6	16.3	
46003	52.0N	156.0W	741	31	1017.4	09 21	959.7	25 16	989.3		739	37	22 19	080		18.6	20.2	21.9	18.5	16.7	16.7	17.8	20.5	19.4	
46004	51.0N	136.0W	739	31	1018.2	14 21	965.3	25 23	997.5		737	39	11 14	210		5.0	14.3	24.4	21.6	22.0	23.0	18.7	20.6	21.8	
46005	46.0N	131.0W	741	31	1027.5	09 00	975.1	25 18	1004.8		741	43	25 17	160		13.1	1.0	23.1	21.0	19.2	20.1	21.0	14.3	19.7	
46006	40.7N	137.7W	741	31	1034.4	08 19	976.5	27 23	1005.7		739	53	24 04	250		10.4	5.8	7.5	26.2	22.3	22.0	23.2	18.1	21.6	
46010	48.2N	124.2W	737	31	1029.6	09 08	980.8	27 00	1012.3		736	31	26 23	170		6.1	7.2	13.6	12.7	18.0	16.2	14.4	10.9	14.7	
46011	34.9N	120.9W	736	31	1026.6	01 18	998.4	29 02	1016.4		519	23	22 11	180		10.3	8.9	6.4	4.0	9.9	9.3	5.3	7.9	08.7	
46012	37.4N	122.7W	639	27	1027.9	07 18	998.0	27 01	1018.2		597	34	26 17	160		12.2	6.7	7.0	14.1	18.2	12.1	7.8	12.2	12.0	
46013	38.2N	123.3W	739	31	1028.4	07 19	996.7	29 04	1017.1		727	35	26 19	170		10.8	7.0	13.3	13.6	19.2	13.5	11.4	16.0	14.1	
46014	39.2N	124.0W	740	31	1029.4	07 19	993.1	27 02	1016.5		729	42	26 13	170		10.1	5.0	5.8	13.9	18.9	13.4	11.2	12.2	12.9	
46016	63.3N	170.3W	229	29	1033.5	01 12	981.1	25 09	1009.8		215	50	17 00	030		13.1	21.9	8.3	11.7	15.1	8.9	8.5	9.0	17.5	
46017	60.3N	172.7W	236	31	1030.9	09 06	975.5	21 06	1005.8		221	37	17 00	060		8.1	19.0	13.1	13.7	13.5	13.3	9.4	9.2	15.2	
46018	60.3N	177.0W									135	36	17 06	030		14.6	19.8	9.4	7.1	12.4	12.9	18.0	13.5	16.3	
46019	57.2N	175.3W	246	31	1032.5	09 21	975.5	24 09	1001.3		246	35	02 12	040		13.0	20.7	16.5	16.4	8.1	6.7	9.0	10.6	16.5	
46020	55.9N	168.0W	246	31	1029.4	09 21	973.3	24 03	997.8		246	36	02 00	020		22.3	17.7	17.6	13.3	10.4	9.3	11.2	15.8	17.3	
46022	40.8N	124.5W	739	31	1032.3	09 19	988.5	26 21	1015.4		729	40	26 15	170		11.5	5.7	5.9	10.5	16.1	11.3	10.6	9.5	12.4	
46023	34.3N	120.7W	740	31	1026.3	01 18	998.2	29 03	1016.3		647	31	29 00	120		13.6	3.5	7.8	13.3	8.3	10.3	6.8	14.4	12.2	
46024	33.0N	119.2W	737	31	1025.7	01 18	1000.8	29 04	1016.3		650	37	29 03	140		7.5	11.3	3.3	12.2	10.3	9.5	9.2	11.7	11.3	
46025	33.8N	119.3W	736	31	1026.6	01 18	1002.9	29 05	1016.7		695	31	29 05	140		5.0	3.8	4.6	9.6	7.7	7.4	8.4	8.9	07.7	
46026	37.8N	122.7W	734	31	1028.7	07 18	997.2	27 00	1017.6		732	32	26 18	160		7.0	11.0	12.4	13.8	17.7	11.6	8.4	11.5	12.5	

JANUARY 1983

			WAVE HEIGHTS (METERS)					FREQUENCY OF WAVE HEIGHTS (%)							
BUOY	LAT	LONG	OBS	MAX	DY	HR	MEAN	<1M	1-1.5M	2-2.5M	3-3.5M	4-5.5M	6-7.5M	8-9.5M	>9.5M
41001	34.7N	072.3W	739	6.0	13	02	2.5		21.7	43.3	21.2	13.3	0.2		
41002	32.3N	075.3W	735	5.5	12	16	2.4		25.4	46.3	12.9	15.2			
41006	29.3N	077.3W	742	5.5	21	22	2.1	0.1	37.6	41.3	15.0	5.7			
42001	25.9N	089.7W	646	5.0	20	03	1.2	27.5	49.2	13.4	6.1	3.5			
42002	26.0N	093.5W	740	3.5	20	09	1.2	23.5	51.2	20.9	4.4				
42003	26.0N	086.0W	289	5.0	20	06	1.2	32.1	50.8	9.6	3.8	3.8			
42007	30.1N	088.9W	115	1.5	26	18	0.6	70.4	29.5						
42009	29.3N	087.5W	568	8.5	20	15	1.3	43.1	35.9	12.1	3.3	3.3	1.9	0.1	
44003	40.8N	068.5W	740	6.0	16	22	2.4	2.2	21.3	42.5	20.1	13.5	0.1		
44004	39.0N	070.0W	675	6.5	29	00	2.6	0.6	26.3	39.4	21.1	11.4	1.1		
44005	42.7N	068.3W	736	6.0	16	07	2.1	9.3	28.2	38.8	15.4	7.7	0.2		
44007	43.5N	070.1W	671	6.0	16	10	1.4	30.9	40.5	18.6	5.2	4.4	0.1		
44008	40.5N	069.4W	675	5.0	11	21	2.1	4.0	33.1	41.3	17.1	9.3			
46001	56.0N	148.0W	732	9.5	21	15	4.0		0.6	22.1	25.8	37.0	11.8	2.4	
46002	42.5N	130.0W	740	10.5	24	14	4.1		5.1	17.7	24.1	31.3	16.8	4.3	0.4
46003	52.0N	156.0W	740	8.0	22	21	3.6		1.0	30.9	23.6	36.4	7.5	0.2	
46004	51.0N	136.0W	735	8.5	1	15	4.6			6.7	21.6	50.0	18.0	3.9	
46005	46.0N	131.0W	730	10.0	25	15	4.3		0.1	21.5	23.0	33.9	16.0	5.0	0.2
46006	40.7N	137.7W	735	11.5	24	05	4.6			15.6	25.1	30.4	21.0	5.3	2.3
46010	48.2N	124.2W	723	8.5	27	02	3.3		14.2	19.5	31.3	27.6	7.0	0.1	
46011	34.9N	120.9W	734	7.5	27	08	2.7	0.4	29.1	27.7	18.3	21.2	2.9		
46012	37.4N	122.7W	628	8.0	26	20	2.6	0.3	30.4	26.2	13.6	19.7	9.0	0.9	
46013	38.2N	123.3W	737	8.5	26	22	2.8		30.4	27.9	14.9	21.9	4.0	0.9	
46014	39.2N	124.0W	739	10.0	26	19	3.2		24.7	24.0	17.0	24.6	6.9	2.3	0.2
46022	40.8N	124.5W	738	9.0	26	17	3.3		14.4	26.4	22.3	28.5	6.3	1.4	
46023	34.3N	120.7W	737	7.5	27	07	2.7	0.2	27.5	28.4	18.0	21.5	4.0		
46024	33.0N	119.2W	734	8.5	27	08	2.5	0.4	44.0	19.8	15.5	16.0	3.6	0.4	
46025	33.8N	119.3W	734	8.5	27	12	2.7	0.3	49.0	17.8	15.5	9.4			
46026	37.8N	122.7W	716	7.5	26	23	2.3	2.7	39.6	24.5	13.9	16.8	2.0		

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